EXHIBIT 13

UNITED STATES DISTRICT COURT

FOR THE

DISTRICT OF VERMONT

* *

JAMES D. SULLIVAN, LESLIE ADDISON, SHARYN JONES, and BISHOP ROBIN HOOD GREENE, individually, and on behalf of a Class of persons similarly situated,

Plaintiffs,

vs.

SAINT-GOBAIN PERFORMANCE PLASTICS CORPORATION,

Defendant.

Case No. 5:16-cv-00125

* *

VIDEOTAPED DEPOSITION OF

ALAN DUCATMAN, M.D.

February 28, 2018

VIDEOTAPED DEPOSITION

OF

ALAN DUCATMAN, M.D., taken on behalf of the Defendant herein, pursuant to the Rules of Civil Procedure, taken before me, the undersigned, Danielle S. Ohm, a Court Reporter and Notary Public in and for the Commonwealth of Pennsylvania, at the law offices of Bailey & Glasser, LLP, 6 Canyon Road, Suite 200, Morgantown, West Virginia, on Wednesday, February 28, 2018, beginning at 8:32 a.m.

A P P E A R A N C E S

JAMES S. WHITLOCK, ESQUIRE
Davis & Whitlock
21 Battery Park Avenue
Suite 206
Ashville, NC 28801
COUNSEL FOR PLAINTIFFS

BERT L. WOLFF, ESQUIRE
RACHEL PASSARETTI-WU, ESQUIRE
Quinn, Emanuel, Urquhart & Sullivan, LLP
51 Madison Avenue
22nd Floor
New York, NY 10010
CO-COUNSEL FOR DEFENDANT

I N D E X

EXHIBIT PAGE

NUMBER	DESCRIPTION	PAGE IDENTIFIED
Exhibit 1	August 2015 ATSDR CDC Tox Guide for Perfluoroalkysis	33
Exhibit 2	Expert Report Dated 9/1/17	40
Exhibit 3	Declaration	41
Exhibit 4	Expert Merits Report, 12/15/17	41
Exhibit 5	Declaration	42
Exhibit 6	7/13/17 Interrogatory Responses From Linda Crawford and Theodore Crawford	46
Exhibit 7	7/24/17 Interrogatory Responses From Gordon Garrison	50
Exhibit 8	C8 and Clinical Conditions And Diagnoses	64
Exhibit 9	February 2015 PFOA Blood Data Tables	101
Exhibit 10	January 2017 ATSDR/CDC Transcript	106
Exhibit 11	Excerpt from U.S. Preventive Services Task Force Procedure Manual	145
Exhibit 12	Excerpt	150

EXHIBIT PAGE (cont'd)

OBJECTION PAGE

P R O C E E D I N G S

VIDEOGRAPHER:

Good morning.

We are going on the record at 8:32 a.m. on February 28th, 2018. Please note that the microphones are sensitive and may pick up whispering, private conversations and cellular interference. Please turn off all cell phones or place them away from the microphones as they can interfere with the deposition audio. Audio and video recording will continue to take place all parties agree to go off the record.

This is Media Unit 1 of the video recorded deposition of Alan Ducatman, M.D., taken by counsel for the Defendant in the matter of James D. Sullivan, et al. v. Saint-Gobain Performance Plastics Corp., et al.

This deposition is being held at Bailey & Glasser, located at 6 Canyon Road, Suite 200, Morgantown, West Virginia, 26508.

My name is Jacob Stock from the firm Veritext, and I am the videographer. The court reporter is Danielle Ohm from the firm Veritext.

I am not related to any party in this action nor am I financially interested in the outcome. Counsel and all present in the room and everyone

attending remotely will now state their appearances and affiliations for the record.

ATTORNEY WOLFF:

Bert Wolff for Defendant.

ATTORNEY PASSARETTI-WU:

Rachel Passaretti-Wu for Defendant.

ATTORNEY WHITLOCK:

Jamie Whitlock with Davis and Whitlock on behalf of the Plaintiffs.

VIDEOGRAPHER:

Will the court reporter please swear in the witness?

COURT REPORTER:

Doctor, will you please raise your right hand?

ALAN DUCATMAN, M.D.,

CALLED AS A WITNESS IN THE FOLLOWING PROCEEDING, AND HAVING FIRST BEEN DULY SWORN, TESTIFIED AND SAID AS FOLLOWS:

EXAMINATION

BY ATTORNEY WOLFF:

Q. Please state your name.

A. Alan Ducatman.
Q. Do you consider yourself to be an expert in epidemiology?
A. No.
Q. Are you a toxicologist?
A. No.
Q. As a general principle, you would agree that physicians and scientific investigators should try to look at issues critically.
True?
A. Yes.
Q. And physicians and scientific investigators are concerned about being accurate.
True?
A. Yes.
Q. As a physician and a scientific investigator, do you subscribe to the principle that it is important to use accuracy and precision in your writings?
A. Yes.
Q. Do you believe that scientists should describe their methods and explain their reasoning so that others can understand how the data were analyzed and how the conclusions were reached?
A. Yes.
Q. You would agree that criticism and rigorous

attempts at refutation of a hypothesis being advanced is an integral part of the scientific method.

Correct?

A. It is the scientific method.

Q. Would you agree that one of the hallmarks of science is the requirement of valid and reliable data?

A. Yes.

Q. In your opinion, is it important to assess all of the available data relevant to the question at hand before arriving at a conclusion?

A. Yes.

Q. Do you agree that no study can be assessed in isolation and that all evidence-based literature is needed to form an opinion in evidence-based medicine?

ATTORNEY WHITLOCK:

Object to the form.

A. Could you repeat that question? It went on a bit.

BY ATTORNEY WOLFF:

Q. Do you agree that no study can be assessed in isolation and that all evidence-based literature is needed to form an opinion in evidence-based medicine?

ATTORNEY WHITLOCK:

Same objection. You can answer if you understand.

A. I think what you said is usually true. It's

almost always true. And then I can think of exceptions.
BY ATTORNEY WOLFF:
Q. Do you agree that all available papers are considered in a scientific deliberation and that selective consideration of the literature is not a scientific procedure?
A. So certainly the latter part --- that's a two-part question. So let's address the easy part first. You don't want to be selective. You want to address what you think is relevant. The first part said all. And all is a tough nut to crack for any human because there's just a lot.
Q. Do you agree that selective cherry picking of data is inconsistent with a valid and reliable scientific methodology.
ATTORNEY WHITLOCK:
Object to the form, vague and ambiguous.
A. Could you repeat the question?
BY ATTORNEY WOLFF:
Q. Do you agree that selective cherry picking of data is inconsistent with a valid and reliable scientific methodology?
A. No one wants to be just cherry picking when they come up with a method.

Q. In your opinion, is it scientifically valid to use one hypothesis to prove another hypothesis?
A. I don't know that I have an opinion about that because I don't yet know what you mean by that.
Q. In scientific writings what does the word suggests mean?
ATTORNEY WHITLOCK:
Object to the form.
A. I think it depends on the author.
BY ATTORNEY WOLFF:
Q. How do you use the term?
A. I try to use it to mean just what it says, that it suggests something else is the case. I think if you wanted a synonym you could use the word supports.
Q. In scientific parlance does the word suggests mean that something is a hypothesis requiring further scientific investigation and study?
A. I don't think so.
Q. You would agree there is a difference in expertise between, A, diagnosing the presence of a medical condition and, B, determining the cause of that condition.
True?
A. A different --- so the expertise to know the cause and the expertise to know that it exists are different?

They're sometimes different and sometimes the same.
Q. You would agree that in most cases and particularly when considering environmental exposures we do not --- strike that.
Wouldn't you agree that in most cases and particularly when considering environmental exposures we do not know what caused the given individual to develop the disease identified in a differential diagnosis.
Correct?
A. That question is so broad I don't know how to answer it. Are we asking that question in the context of a person who has a particular exposure known to cause the disease or are we asking it in the context of just the general population and you're saying a person has this disease; therefore, did that cause it?
Q. I'm asking a person comes in and gets diagnosed with a disease. Wouldn't you agree that in most cases and particularly when considering environmental exposures we don't know what caused that individual to develop the disease?
A. You know, I followed you through most cases, because that made sense, up to the point when you said and considering environmental exposures, at which point you become wrong in a lot of cases. So I agree with

sort of half of your hypothesis or whatever you want to call that, your statement, and the rest I think I'm unsure about because I'm not sure I know what you mean.

Q. Doctor, do you remember giving a deposition under oath in the case of Wiley against Fairmont General Hospital on June 17th, 1996?

A. No.

Q. Okay.

I'll give you a copy of the transcript of your deposition from that case and direct your attention to page 14, line three.

ATTORNEY WHITLOCK:

And I apologize. That was page 14, line three?

ATTORNEY WOLFF:

Correct.

BY ATTORNEY WOLFF:

Q. And Doctor, do you remember me asking you this question? Question, Doctor, wouldn't you agree that in most cases we do not know what caused the given individual to develop the disease identified in the differential diagnosis. And your answer was what?

A. Well, your question was actually different. You asked your question in two parts, so let's --- please, excuse me, let's ask the court reporter to read back

the entire question with the business about the environment in the question when you asked it because let's just get the specifics so it's clear to anybody who might be ---.

Q. Let me ---.

A. Excuse me. Let me finish.

Let's say that we have somebody --- I mean there's --- there's examples everybody can relate to, so you know, if you ask me this person has lung cancer, do we know what caused the person's lung cancer, and we both know where I'm going with this, the answer is no, we don't know. Okay.

But if you ask me this person caused lung cancer and this person was a three-pack-a-day smoker for 30 years, do we know what caused this person's lung cancer, the answer is, to a reasonable degree of medical certainty, this person's lung cancer was caused by cigarette smoking.

So when you ask the question and it's about the entire population independent of an environmental question, the answer is yes. If you ask the question and you get down to an environmental question where --- which wasn't asked in 1996 and, you know, if I answered it wrong in 1996 and answered it better today, that would also be a detail.

But the point is you asked the question about an environmental exposure tagged on at the end of the question. And I specifically stated in my response to you that, in general, we often don't know, but where you get into the environmental issue we sometimes do know.

Q. Do you remember being asked this question and giving this answer? Question, Doctor, wouldn't you agree that in most cases we do not know what caused a given individual to develop a disease identified in a differential diagnosis? And your answer was again, if you are thinking about external etiologic agents present in the environment, then I would agree with you. And if that's the purpose of your question then I can say, yes.

Do you recall giving that testimony, sir?

A. I do. And the point of that answer is that we generally don't know what the external agent is. But when we do know what the agent is, which is the way you framed your question, okay, then sometimes that general point about the population becomes --- becomes the subpopulation and whom we do know the answer or we suspect the answer.

So again, this question was asked differently. It was asked about the general population and whom we are

not given any information about an etiologic agent, in which case we don't know if an etiologic agent has caused it. So my answer actually was correct then and is correct today.

Q. Are you done?

A. Yes, sir.

Q. Good. Would you agree that the word association is not a substitute for the word causation?

A. Yes.

Q. In fact, wouldn't you agree that distinguishing between the concepts of causation and association is an important area of scientific discussion?

A. Yes.

Q. Wouldn't you agree that a number of different relationships may exist between an exposure and an outcome and in one type may be a spurious association resulting from chance, bias or confounding?

A. Yes,

Q. Do you agree that three general categories of phenomena can result in an association found in a study to be erroneous, chance, bias and confounding?

A. Could you repeat the question?

Q. Sure.

Do you agree that there are three general things that can result in an association that is found in a

study to be erroneous, chance, bias and confounding?
A. I agree that all three of those can pertain.
Q. Does a statistically significant finding in a reliable epidemiological study that looks at disease as a function of exposure necessarily mean that there is a causal relationship?
A. No.
Q. Would you agree that if bias or confounding affects a study it can invalidate an association that the study found even if it was statistically significant?
A. It can.
Q. Can confounders be both known and unknown?
A. Yes.
Q. And can there be both known and unknown sources of bias in an epidemiological study?
A. Yes.
Q. When you read the report of an epidemiologic study in order to determine whether the results are supportive of a cause and effect relationship between the exposure and the disease, besides the relative risk ratio, will you consider the study design, the study numbers, the accuracy of the study, whether the study results have been replicated elsewhere, biological plausibility, internal consistency, dose response, the

confidence intervals, the statistical power, how well the diagnoses were made and whether there is a pathologic confirmation if the issue is cancer?

ATTORNEY WHITLOCK:

I'm going to object to the form to the --- I don't even know the proper word for the type of compound question that that was.

If you understood it, Dr. Ducatman, you're welcome to answer.

A. There's one of them that you generally don't know about because you have trouble discerning accuracy from an external place. However, all of those things are important. And the point I'm making is that those things are important.

BY ATTORNEY WOLFF:

Q. You would agree that the statistical significance test is a test of the data and not of the hypothesis being advanced.

Correct?

A. Well, you're both --- you're right about that in a narrow sense. And then in the wrong sense, when enough statistical tests have been done on a hypothesis in enough different settings people begin to believe that the things are related.

So in a narrow technical sense, in a one-time

study I think that you're right. And then as information piles up people begin to think that statistical significance at some point begins to relate to causation or at least to association and then ultimately, in many cases, to causation. So mostly right, but there's a caveat there depending on how much work has been done.

Q. If the 95 percent confidence interval includes one or, in fact, if the confidence interval for any pre-determined level of statistical significance includes one, then the data are not statistically significant for that finding, are they?

A. Well, okay. That's a technical question in which the answer can be wrong if the statistical significance is set at a different level than 95 percent. But if it's set at 95 percent, then what you said is a tautology. It's a definition rather than additional information. Say you defined it that way and, therefore, it's true.

ATTORNEY WHITLOCK:

Counsel, did you mark this as an exhibit?

ATTORNEY WOLFF:

No.

ATTORNEY WHITLOCK:

I'd ask that you do. If you're going to

continue reading prior testimony of the deponent, Counsel, I ask that you mark that as an exhibit to the deposition, please, sir.

BY ATTORNEY WOLFF:

Q. Epidemiological studies never establish causation in a particular person, do they?

A. Epidemiologic studies are not intended to establish causation in a particular person. We do make inferences that are based on epidemiology all the time.

Q. Doctor Ducatman, do you recall being asked this question and giving this answer on page 17, line 11, at your deposition in the Wiley matter? Question, do epidemiological studies establish causation in a particular person? Answer, never.

A. I think I just said that we do not use epidemiologic studies to establish causation in a particular person. We use epidemiologic studies to make inferences about causation, which then get applied to people.

Q. What is a cross-sectional study?

A. It's a study which doesn't have a temporal element.

Q. And cross-sectional studies examine both the exposure of interest and individuals with or without the disease of interest at a single point in time.

Correct?
A. That's right.
Q. And while cross-sectional studies can determine the prevalence of disease, they do not determine the incidence or the risk of disease.
True?
A. You said two things. Could you --- could you make that easier on yourself by boiling it down to one thing so that we don't get into tearing the sentence apart?
Q. Yeah. Let's do it --- let's do it two questions.
While cross-sectional studies can determine the prevalence of disease, they do not determine the incidence of disease.
True?
A. Correct.
Q. While cross-sectional studies can determine the prevalence of disease, they do not determine the risk of disease.
True?
A. That's not necessarily correct.
Q. When is it not necessarily correct?
A. Cross-sectional studies can give you a risk ratio.
Q. What are the limitations of cross-sectional studies?
A. There are many.

Q. What are they?
A. First of all, they don't give you incidence, just as you've pointed out.
Secondly, they are subject to biases. The incidence studies are not very good at dealing with diseases which take people out of the population before the study is done. So cross-sectional studies are bad at looking at diseases that are rapidly fatal.
They also have problems with extremely common diseases in some cases unless there are biomarkers, in which case they actually become good.
Q. Are you finished with your answer?
A. I'm sure I can think of more if I sat --- I'm not sure you want me to sit and think of more answers. It's up to you.
Q. Let me ask you this. Are you comfortable with your answer?
A. I am comfortable with it, although I'm sure it's incomplete. I'm sure there's more things that we could discuss.
Q. In cross-sectional studies, because both exposure and disease are determined at the same point in time, such studies do not demonstrate that the exposure preceded the disease, do they?
A. That depends. They often do.

Q. Isn't it true that because cross-sectional studies measure exposures and health conditions simultaneously the temporal relationship between an exposure and a disease cannot be inferred in a cross-sectional study?
A. Again, that depends. It depends on how the cross-sectional study was done.
Q. What about the design of a cross-sectional study would allow a temporal relationship to be satisfied?
A. If the --- if the study allowed you to know when the diagnoses were made, even though you don't have an incident population, and you also know when the exposures occurred, even though you don't have an incident population, you can make inferences about the relationship between the exposures and the outcomes in the study with limitations that have already been mentioned and possibly some others.
Q. Is it fair to say that cross-sectional studies are rarely useful in identifying toxic agents?
A. I have to think about that quite a bit because you may know that I've written about --- fairly extensively, I'm considered an expert on what --- how new diseases are detected. And it turns out that while on average we don't detect a new disease or a new cause of a disease very often, when we do detect one it's more often not an incident study. It's more often a

cross-sectional study or even simply a case report in some cases which allows us to detect the initial presence of a cause of a disease that we didn't know about before.

So there's two ways to think about that. If you look at --- this is kind of like your population question before. If you look at when you don't know anything and it's everything in the world is out there, the answer to your question would be yes because it's rare that we find new diseases.

But let's say that something new raises its head. Let's --- let's take it away from this topic so it's neutral. Let's say it's bronchiolitis obliterans in people who make flavorings for popcorn.

Q. Yes, the diacetyl issue?

A. Correct.

Q. Okay.

A. So there you have it exactly. So it was not first noticed because somebody did an incident study.

Q. Right. Alan Parnet came up with it?

A. Well, there's actually some disagreement about who thought of it first. I'm not going to get into --- I mean, generally, he's credited. I've heard of others. That's not important. The point is that it depends on context as to how useful the cross-sectional study is

for identifying new diseases. And it turns out that where new diseases arise, that just happens to be one of the ways we find them and it's not at all that uncommon.

Q. Let's switch gears for a moment.

Okay?

When we say that something is biologically plausible that simply means that it makes biological sense.

True?

A. Yes.

Q. You would agree that biologic plausibility is not synonymous with causation, wouldn't you?

A. Yes.

Q. Does the dose response relationship stand for the proposition that the greater the dose, the greater the likelihood for the effect?

A. That's generally how it's interpreted.

Q. Is it fair to say that it is not ---?

A. Excuse me. Let me interrupt myself. I apologize.

That is generally how it's interpreted when it's monotonic. And there are times when it's not. They are rarer and then people get into arguments.

Q. Monotonic meaning what for the benefit of the Judge?

A. That it's either linear or log-linear or --- increasing the dose leads to increasing outcomes. There are these puzzling things that people see where there are inverted U shapes and things like that and you hear the head of NIEHS discuss these in public places. But generally when people talk about dose response they're not talking about these puzzling things. They're generally talking about the historical linear dose response curves. So that's how I initially answered the question.

Q. So they're not talking about hormesis and things like that?

A. Well, hormesis is yet another question.

Q. All right.

Let's defer that issue.

A. Yeah, let's not get --- let's please not get into --- hormesis has nothing to do with anything that you're concerned about today that I can think of, so let's not get into that.

Q. Isn't it fair to say that it is not only important to know that a substance is capable qualitatively of causing something, but that is also important to know the quantitative eligibility of the suspected agent?

A. Could you say that a different way?

Q. Sure.

Is dose important?
A. Yes.
Q. Isn't there a classic saying that everything is toxic and that it's just a matter of dose?
A. Yes.
Q. So then a sufficient dose of table salt can be quite toxic.
True?
A. Yes.
Q. Oxygen can be toxic?
A. Very.
Q. What is a threshold?
A. Threshold is generally the lower limit of detection in --- it depends on if you're talking about humans or all species.
Some --- and it's not stipulated in advance. It's just the lowest threshold you can find for some outcome that is physiologically there and generally considered to be detrimental.
Q. Is it fair to say that the concept of a threshold suggests that below a certain exposure something is not toxic?
A. That's a very simple sounding question with a very complicated answer. Do you want me to start into that?
Q. If you could answer it yes or no, that would help?

A. I will answer it no because you've implied that if we have a threshold that we know is not toxic below that threshold, and that's incorrect.
Q. You would agree that cigarette smoking can cause lung cancer.
Correct?
A. Yes.
Q. You would not consider smoking one cigarette in a lifetime to pose a significant risk of lung cancer, would you?
A. I don't recommend smoking any cigarettes. I'm not sure what you mean by significant. However, most people who smoke one cigarette in their life don't get lung cancer and also don't tell us about smoking that one cigarette.
Q. If someone did develop lung cancer after smoking one cigarette, would you conclude there was a significant probability that it was caused by the one cigarette?
A. No.
Q. Do we agree that a temporal relationship does not establish causation? In other words, just because a condition follows an exposure it does not necessarily mean that the exposure caused the condition.
Correct?

A. That's correct. And in addition, to save time, the opposite is very important, to say the exposure has to precede the condition.
Q. And when one considers the effects of exposure to a chemical, isn't it important to distinguish between effects that have been reported and those which are merely feasible or theoretically possible?
ATTORNEY WHITLOCK:
Object to the form.
A. I'm confused by the question. Let me tell you why I'm confused. When we --- when we --- when we do research we generally don't enter into some list of things that are theoretically possible that are unrelated to the topic. We just generally don't even go there. So I'm not sure yet what the question means. If you can give me a specific as to how you mean that it might help me to answer the question better.
BY ATTORNEY WOLFF:
Q. I'm just going to move on. Thanks, Doctor.
Is it fair to you say that extrapolating data from animal models to humans can be fraught with difficulties?
A. That's fair.
Q. Is it fair to say that attempts to extrapolate data from animal models to humans must be done with

caution?
A. It must be done with scientific capability. It's --- all of science is done with caution. There's no more caution needed for that extrapolation. And --- and I'm not totally sure that the word that you should use or that I should use, since it's me answering the question, is extrapolation.
Let's just say that animal models give us lots of very important information. And so that it's clear, defense experts also use that information all the time, okay. And the information should be used as correctly as we can and in the right context.
Q. Okay.
Would you please turn with me to page 35, line one of your deposition in the Wiley case. And my question to you is do you recall being asked this question and giving this answer. Question, isn't it fair to say that attempts to extrapolate data from animals to humans must be done with caution. And your answer was yes.
Correct?
A. I'm sorry. I still haven't found this.
Q. Page 35, line one to line four.
A. That's correct.
Q. Isn't it fair to say that, among other things,

there can be interspecies differences in metabolic rates, anatomy, cellular or biochemistry and in the absorption, distribution, metabolism and elimination of chemicals?

A. Yes.

Q. Wouldn't you agree that the results of an animal study will be influenced in part by which species of animals are used?

A. Yes. And it's --- to, be clear it's even finer than species. Within species there are specific animals bred for specific purposes. And the selection of those are very important to studies.

Q. So even different strains of the same species sometimes experience different reactions to the same substances.

True?

A. Yes, that's --- that can be true.

Q. And what is the ATSDR?

A. The ATSDR is the Agency for Toxic Substances and Disease Registry. It's an important part of the U.S. Centers for Disease Control and Prevention.

(Whereupon, Exhibit 1, August 2015 ATSDR CDC Tox Guide for Perfluoroalkyls, was marked for identification.)

BY ATTORNEY WOLFF:

Q. Dr. Ducatman, Exhibit 1 is a copy of the August 2015 ATSDR CDC Tox Guide for Perfluoroalkyls.

Have you seen this document before?

A. Yes.

Q. Please turn with me to the second page and the right-hand column and the second bullet point.

Are you there?

A. I think I'm on the second page because the other one is labelled with a red one, but I'm not sure which is one and which is two.

Q. You're on the second page.

The second bullet points says, and I quote, the primary effects observed in animals include liver toxicity, developmental toxicity and immune toxicity. There are profound differences in the toxicokinetics and mode of action of perfluoroalkyls between humans and experimental animals. Many of the observed effects in animals result from the ability of PFOA and PFOS to activate peroxisome proliferatory-activated receptor alpha, PPAR-alpha.

Humans are much less responsive to PPAR-alpha than rodents and thus may not be as susceptible to these types of effects, closed quote.

Have I read that correctly?
A. I'm sorry. I'm not reading it along with you. I'm just listening to you read it. And I assume you read it correctly.
Q. Do agree with that statement?
A. I agree with much of the statement. And there's a piece of it that I'm sure --- I can't speak for ATSDR. I used to advise them, but I can't speak for them.
There's a piece of it that if an ATSDR scientist and I were sitting down together, we could discuss why they wrote it that way and when they're going to change it.
Q. What would that be?
A. Okay.
So let's go --- can you point to where this is?
Q. Yes.
A. Primary effects? Okay. Thank you.
So it is true that many of the effects in animals are due to PPAR-alpha. Okay. It's also true that effects in humans are due to PPAR-alpha. And it's also true that animal PPAR-alpha in many cases is much more present and much stronger than it is in humans. So that's the piece of it that is true.
Now the issue is that actually well before 2015, but certainly in the past couple of years, it's become

clear that both in animals and in humans many of the effects are not PPAR-alpha. And despite the weaker PPAR-alpha in humans, there are things that we see in humans that it took us a while to figure out how to see in animals.

Q. Is it fair to say that all human beings are exposed to thousands of chemicals and they have many infectious diseases and they are a complex product of their environment and their genetics?

ATTORNEY WHITLOCK:

Object to the form. Compound question.

A. So the syntax of that question in which I heard, but you probably don't mean, that the chemicals have infectious diseases is puzzling to me. Could you clarify what you mean?

BY ATTORNEY WOLFF:

Q. Sure.

Is it fair to say that all human beings are exposed to thousands of chemicals, that human beings have many infections diseases and that human beings are complex product of their environment and their genetics?

A. There's nothing terribly wrong with that statement. If I were describing human beings, that's not how I'd do it, but that's --- there's nothing wrong

with that statement.
Q. When considering the effects of exposure to a chemical, shouldn't one consider what is known, what is not known and what the external risk factors are for the individual?
A. You know, I heard the question, but I don't understand it.
Q. Have you spoken to any of the individual Plaintiffs?
A. No.
Q. Have you examined any of the individual Plaintiffs?
A. No.
Q. Have you reviewed any medical records for any of the individual Plaintiffs?
A. No, save one possible exception. I've seen a couple of serum concentrations.
Q. And that's the full extent of ---?
A. That's correct.
Q. Okay.
Different people drink different amounts of water on average over the course of --- course of a day.
True?
A. Yes.
Q. Some people will typically drink only tap water,

some people will typically drink only bottled water and some people will typically drink a combination of both.

True?

A. Yes.

Q. And the sources of tap water, even in the areas at issue in this matter, can be different from house to house.

Correct?

ATTORNEY WHITLOCK:

Objection. Calls for speculation.

A. I think you're asking me do these individuals, some of them reside with private wells that are different from each other. And if that's the question, the answer is yes.

BY ATTORNEY WOLFF:

Q. And some of them also have water delivered from the municipal supply as opposed to private wells.

True?

A. I'm not aware of individual behaviors in that regard, but it's a --- it would be speculation on my part and I think it's probably --- especially now, after contamination has been discovered, a very reasonable speculation.

Q. Different people will also use different sources of water for cooking.

Correct?
A. Yes.
Q. Some people will cook exclusively or primarily with tap water, whereas other people will cook exclusively or primarily with bottled water.
Correct?
A. I think that's true. I think there is probably fewer differences between people --- I know people who do cook with --- with delivered bottled water, but most people cook with tap water.
Q. At the time you issued either your first report or your second report in this matter did you have any Plaintiff-specific information as to the average daily consumption of water by the individual Plaintiffs?
A. No.
Q. As of the time you issued either your first or your second report in this matter did you have any Plaintiff-specific information as to the percentages of tap water versus bottled water typically consumed by the individual Plaintiffs?
A. No.
Q. Do you know whether the water consumption practices and patterns of the proposed class representatives are typical of the water consumption practices and patterns of the absent class members?

A. I don't know for either class --- or group. I should say group.

(Whereupon, Exhibit 2, Expert Report Dated 9/1/17, was marked for identification.)

BY ATTORNEY WOLFF:

Q. Dr. Ducatman, Exhibit 2 is a copy of your expert report for class certification in this matter dated September 1, 2017.

Correct?

A. I won't --- I'll accept the date. I don't remember what the date is. I assume you're correct.

ATTORNEY WHITLOCK:

For the record, what was Exhibit 1, Counsel?

ATTORNEY WOLFF:

The ATSDR Tox Guide.

ATTORNEY WHITLOCK:

And you're not marking the deposition from over 20 years ago that you repeated many of the questions verbatim from.

Correct?

ATTORNEY WOLFF:

Correct.

ATTORNEY WHITLOCK:

Okay.

(Whereupon, Exhibit 3, Declaration, was marked for identification.)

BY ATTORNEY WOLFF:

Q. Exhibit 3 is a copy of your Declaration in which you declare that your class certification report contains a complete statement of all opinions you will express relevant to the issue of class certification and the basis and reasons for them as well as the materials you considered in forming these opinions.

Correct?

A. Yes.

(Whereupon, Exhibit 4, Expert Merits Report, 12/15/17, was marked for identification.)

BY ATTORNEY WOLFF:

Q. Exhibit 4 is a copy of your expert merits report in this matter dated December 15, 2017.

Correct?

A. I'll accept the date and it is my report.

Q. And in the opening words of your expert merits report, in the first sentence you state that the contents of your class certification report are incorporated by reference into your merits report.

Correct?

A. Yes.

(Whereupon, Exhibit 5, Declaration, was marked for identification.)

BY ATTORNEY WOLFF:

Q. Exhibit 5 is a copy of another Declaration in which you declare that your expert merits report contains a complete statement of all opinions you will express relevant to the merits of this matter and the basis and reasons for them as well as the materials you considered in forming these opinions.

Correct?

A. Yes.

Q. Just as a housekeeping matter, in order to prevent the questioning today from getting unwieldy, please understand when I use the phrase your report I am going to be referring generally to your class certification report, which is Exhibit 3.

If I want to direct your attention specifically to

your merits report, which is Exhibit 5, I will try to use the phrase merits report.

ATTORNEY WHITLOCK:

Counsel, both of those exhibits you just stated are wrong. The merits ---.

ATTORNEY WOLFF:

I'm sorry. You're absolutely right.

Strike that.

BY ATTORNEY WOLFF:

Q. In order to prevent the questioning from getting unwieldy, Dr. Ducatman, please understand that when I use the phrase your report I am referring generally to your class certification report, which has been marked as Exhibit 2. And if I want to direct your attention specifically to your merits report, which has been marked as Exhibit 4, I'll try to use the phrase merits report.

Okay? Okay?

A. Exhibit 2 is what you'll usually be referring to?

Q. Correct.

Now, page 13 of your report, Exhibit 2, six lines up from the top, you state that the Bennington population is homogenous only in their exposure to PFOA through their drinking water. That's what you wrote.

Correct?

A. Yes.
Q. What do you mean by homogenous?
A. That the thing that makes them into a population in a public health sense or medical sense is that the common risk they share for those who --- let's leap ahead and say that the class is certified and it's certified consisting of people who have PFOA documented to be in their bodies. Those people will be homogenous in the sense that they have been exposed to PFOA in drinking water.
Q. At any level?
A. No. There's a --- I don't recall that we said any level. I recall that there was actually ---.
Q. You said above background?
A. Yes.
Q. Above back.
So when you say homogenous you mean that they have been exposed to PFOA and have PFOA in their blood serum above background levels?
A. Correct.
Q. At the time you issued your report had you reviewed the Second Amended Complaint in this matter?
A. Second --- so I should be able to answer that question, but you're talking --- you're using legal terms and I may need to figure out what you mean and

the dates on things.
Q. Have you reviewed any of the complaints in this matter?
A. I have reviewed the Second Amended Complaint. But do I recall when I saw it? I do not. This is a date thing and I just don't remember in what sequence I saw what.
Q. Were you aware that the named Plaintiffs in this matter have submitted sworn Answers to Interrogatories?
A. I don't think so. If I'm wrong, the Plaintiff attorney can correct me, but I don't think I've seen or known about their sworn answers.
Q. Since it's not listed in your report, at the time you issued your report, had you reviewed any of the Interrogatory Answers from any of the named Plaintiffs?
A. I don't think so. I could stand corrected, but I don't think I did.
Is that what --- is that what --- no, the Second Amended Complaint can't be their Interrogatories, so that's something else.
Q. Have you reviewed any of the Interrogatory Answers from any of the named Plaintiffs since you issued either your class certification report or your merits report in this matter?
A. I think I already answered that. I don't think I

have. But if Plaintiff attorney says I have I could stand corrected, but I don't remember seeing any of their discussions about their histories.

(Whereupon, Exhibit 6, 7/13/17 Interrogatory Responses from Linda Crawford and Theodore Crawford, was marked for identification.)

BY ATTORNEY WOLFF:

Q. Marked as Exhibit 6 I'm handing you a copy of the July 13, 2017 Interrogatory Responses from Linda Crawford and Theodore Crawford. To the best of your recollection, Dr. Ducatman, you have not seen these before.

Correct?

A. That's correct, I have not --- I do not recall ever seeing these before.

Q. Please turn with me to Response One on page three. The Interrogatory Response states that Mr. and Mrs. Crawford purchased their home at 643 West Road, Bennington, Vermont, in 1985 and have lived there since then.

Correct?

A. That's what it says.

Q. So they've been living at their home in Bennington for more than 30 years.

True?

A. This is what date? Yes, it's got to be the last couple of years, so that is true.

Q. Please turn with me to Interrogatory Responses Six, Seven and Eight on pages four and five. In each instance after the objections the responses state, quote, our home has a private well that tested nondetect for PFOA on September 21, 2016. A more recent test on April 13, 2017 showed PFOA at 4.1 parts per trillion. Our blood tests from 2016 appear to indicate that we have not been exposed to PFOA in our water.

Do you see that?

A. Yes.

Q. How do these sworn Interrogatory responses from Mr. and Mrs. Crawford square with your assertion that that the Bennington population is homogenous only in their exposure to PFOA through their drinking water?

ATTORNEY WHITLOCK:

Objection to form, misleading.

A. I actually don't understand your question because it's not clear to me what their blood tests showed and we already discussed who would be and who wouldn't be

in the population. So I don't know --- I have no way of knowing if your question is misleading by accident or deliberately or if it has a correct implication in it. I just can't tell because the data are not there.

BY ATTORNEY WOLFF:

Q. Okay.

Well, if you take a look at each --- the last sentence in each response it says our blood tests from 2016 appear to indicate that we have not been exposed to PFOA in our water.

Do you see that?

A. Right.

Q. And then ---.

A. That's what they said. Now, let's assume --- let's go down the list.

I'm sorry. Go ahead and ask your question.

Q. On page seven there is a sworn statement that they have read these Interrogatory Answers and swear under the pains of penalties of perjury that the answers are true and correct to the best of their knowledge, information and belief.

Do you see that?

A. Yes.

Q. How do these sworn Interrogatory responses from Mr. and Mrs. Crawford square with your assertion that

the Bennington population is homogenous only in their exposure to PFOA through their drinking water?

ATTORNEY WHITLOCK:

Same objection to the form, misleading.

A. I find your question to continue to be puzzling and --- and I'm trying to find a gentle word --- not just puzzling, I don't want to use the word misleading because it's already been used. I don't know that these people, these two individuals who are actually --- one is a healthcare professional I can see from this document. I don't know that they would be in the population. And you have put that question as if not only do I know, but they definitely are in the population, whereas all of the answers make it appear that they are not. But I can't be sure, so I mean --- how to put this.

It's very difficult to answer question when they're that --- is there a good synonym for misleading?

BY ATTORNEY WOLFF:

Q. I don't know that it was misleading. I thought I was right up to you until you said it was misleading. I thought it was a perfectly fine answer up until that point.

Were you aware of the fact that in their Second Amended Complaint in this matter the Plaintiffs

affirmatively allege that the property in North Bennington owned by Plaintiff Gordon Garrison receives its drinking and domestic water not from a private well but from the Town of Bennington?

A. I'm sorry. Are these people the Garrisons?

Q. No.

A. You're losing me. Of course I'm not aware of what you asked, but I'm not sure why you're asking me the next question. I don't --- I don't understand the question yet, but I'm certainly not aware of anybody saying that.

Q. Okay.

A. And I don't know why you're asking.

Q. Okay.

(Whereupon, Exhibit 7, 7/24/17 Interrogatory Responses from Gordon Garrison, was marked for identification.)

BY ATTORNEY WOLFF:

Q. Marked as Exhibit 7 I'm handing you a copy of July 24, 2017 Interrogatory Responses from Gordon Garrison. And based on what you've told me, to the best of your recollection, you have not seen these before.

True?

A. True.
Q. Please turn with me to Interrogatory Response Number One on page three. That response states that Mr. Garrison purchased his home at 19 Hillside Street in North Bennington, Vermont in 1994 and has resided there since that time.
Correct?
A. Yes.
Q. So he's been living at his home in North Bennington for more than 20 years.
True?
A. True.
Q. Please turn with me to Responses Six, Seven and Eight on pages four and five. And in each instance, after the objections, the responses state, quote, my home has town water and so I believe I have not been exposed to PFOA in my water, closed quote.
Do you see that?
A. Yes.
Q. How do these sworn Interrogatory responses from Mr. Garrison square with your assertion that the Bennington population is homogenous only in their exposure to PFOA through their drinking water?
A. I don't even begin to see any contradiction. And I assume that you don't either. But in any event, this

individual, if he's correct and he has been drinking delivered water that's not contaminated, let's say delivered from a municipal facility, is not contaminated with PFOA, he would not be in the population that we've discussed.

Q. Were you aware that in their Second Amended Complaint the Plaintiffs allege that the property in North Bennington owned by James Sullivan and Leslie Addison has a private drinking well that analytic sampling showed to have 293 parts per trillion of PFOA?

A. Do I have that in front of me?

Q. No.

A. No.

Q. Were you aware that in the Second Amended Complaint the Plaintiffs allege that the property in North Bennington owned by William Sumner has a private drinking well that analytic sampling showed to have 580 parts per trillion of PFOA?

A. No.

Let me provide one question. I have seen well reports. I do not remember if those well reports are linked to individual names. And if they are, I certainly don't remember whose names they are.

Q. Fair.

Do you have copies of those well reports with you?

A. No.
Q. Back in your office?
A. No.
Q. When did you see them?
A. There are well reports that are --- I first saw some well reports on or about March of 2017. And I was in my office at the time and they were given to me. Since that time my office has undergone a move and I was told I could get back into the old office and everything in it was gone by the time I got back in, so I don't have those well reports.

ATTORNEY WOLFF:

Off the record for half a second. We can stay on the video.

(WHEREUPON, AN OFF RECORD DISCUSSION WAS HELD.)

ATTORNEY WOLFF:

Back on.

BY ATTORNEY WOLFF:
Q. Dr. Ducatman, were you aware that in their Second Amended Complaint the Plaintiffs allege that the property in North Bennington owned by Ronald Haustor has a private drinking well that analytical sampling showed to have 2,730 parts per trillion of PFOA?

A. I'm aware of high levels, but I don't relate them to individual names. I don't have a memory capable of doing that.

Q. In the first full paragraph on page four of your class certification report you state that consistent with the published literature of the Vermont Department of Health has found that PFOA levels in the blood of Bennington residents are strongly correlated with PFOA levels in well water.

Correct?

A. Yes.

Q. And towards the bottom of page three of your report you state that, as of January 27, 2017 the average blood serum level of PFOA among Bennington residents tested by DOH was 10 micrograms per liter.

Correct?

A. That's in my reports.

Q. And in contrast, at the top of page four of your report you state that the blood serum levels of PFOA measured in the Plaintiffs Sullivan, Addison, Sumner and Haustor are --- are 24.8, 40.9, 305.1 and 204.1 micrograms per liter respectively.

Correct?

A. Yes.

Q. And at the low end, among the individual

Plaintiffs whom you list, the 24.8 micrograms per liter from Mr. Sullivan is nearly two and half times greater the 10 micrograms per liter average among the Bennington residents who were tested.

Correct?

A. Yes.

Q. And at the high end, among the individual Plaintiffs whom you list, the 204.1 micrograms per liter for Mr. Haustor is 20 times greater than 10 micrograms per liter average among the Bennington residents who were tested.

Correct?

A. Yes.

Q. And even though they are named Plaintiffs, in your report you do not address the PFOA levels in Mr. Crawford, Mrs. Crawford and Mr. Garrison, do you?

ATTORNEY WHITLOCK:

Object to the form.

A. They don't appear there.

BY ATTORNEY WOLFF:

Q. Why did you choose not to address in your report the PFOA levels in Mr. Crawford, Mrs. Crawford or Mr. Garrison?

A. I don't recall why I didn't.

Q. Among the individuals residing within the areas at

issue in this matter would you expect there to be considerable individual differences as to their amount and length of exposures to PFOA?
A. Yes.
Q. Would you expect there to be considerable individual differences as to what their PFOA blood serum levels would be?
A. Yes.
Q. Would you expect there to be considerable individual differences as to what their susceptibilities, if any, to PFOA might be?
A. Yes.
Q. As to those individual differences and exposure of blood levels and susceptibilities, if any, would that be a function of a number of different variables?
A. Yes.
Q. And those individual differences would be a function of, among other things, their ages.
Correct?
A. Age would be a variable.
Q. And those individual differences would be a function of, among other things, their gender.
True?
A. Yes.
Q. Those individual differences would be a function

of, among other things, their physiology.
Correct?
A. Yes.
Q. Those individual differences would be a function of, among other things, how long they lived in the area.
True?
A. Yes.
Q. Those individual differences would be a function of, among other things, their rates of daily water consumption.
Correct?
A. Yes. And not just that, for the time that they lived near the factory also, you know, their tidal volume for breathing, because that's another route of exposure.
Q. Those would all be different?
A. Yes.
Q. And the individual differences would also be a function of, among other things, the concentrations of PFOA in the water they drank.
Correct?
A. Yes.
Q. And those individual differences would also be a function of, among other things, their sources of

water.

Correct?

A. You're pointing out their different --- their different wells when they had wells or if they weren't on a well and got delivered city water, is that what you mean?

Q. Yes.

A. Yes, that's correct.

Q. And the individual differences would be a function of, among other things, their diet and nutrition.

Correct?

A. There are differences between all of us from PFOA and PFOS contaminants based on diet and nutrition. And for most of us who don't have contaminated water, those are the key ones, okay. So if you and I are lucky enough to live in an area that's not contaminated, those would be the biggest differences between us because our water wouldn't be the important source.

Q. The individual differences would be a function of, among other things, drug and alcohol use.

Correct?

A. Are you now talking about PFOA concentrations or are you talking about their health?

Q. So I'm talking about their differences in exposure, blood levels and susceptibilities, if any, to

exposure to PFOA.
A. Okay.
So if it's susceptibility, then the answer becomes yes. Those --- those --- you can actually see tiny differences in PFOA based on some of those, but they're actually not that important. But --- but when you talk about susceptibility for sure, that becomes an issue.
Q. And those individual differences would be a function of, among other things, their body weight and Body Mass Index or BMI.
Correct?
A. Yes.
Q. And those individual differences would be a function of, among other things, their general state of health as well as other medical conditions.
Correct?
A. Yes.
Q. And those individual difference would be a function of, among other things, their occupational histories.
Correct?
A. If their occupation had exposure to perfluoroalkyl substances, that would be another and very important route of exposure.
Q. In your opinion, what else, if anything, would

those individual differences in either exposures, blood levels or susceptibility to PFOA, if any, be a functions of?

A. Okay.

I don't remember all the things you mentioned, but let me go down a list of things that we often adjust for. So --- and you may think you included these under general health, but renal function would certainly be one. It turns out to actually not be as important as you would expect. Big differences in renal function for humans make only pretty small differences in perfluoroalkyl substance in your serum, but they make some.

Then another one that you may have mentioned and I simply don't remember is drugs. There are some drugs that can make a pretty substantial difference. They're actually fairly rare, but there are some that can make a big difference, especially for PFOS more than PFOA.

You mentioned gender. You mentioned age. Within gender the specific --- and technically, because I'm a doctor, I should be saying sex and not gender. Within sex, the thing that --- the things that matter are very specifically menstruation and lactation and pregnancy. Menstruation is a way that PFOA leaves the body. Very unfortunately, so are lactation and pregnancy. So

menstruation is a good way for it to leave the body. Unfortunately, lactation and pregnancy are terrible ways for it to leave the body because we're now passing the contaminant to a fellow human being or to a child.

Let me see what else. There are so many things. I'm a little worried about not being complete. Do you want me to stop or do you want me to think of others?

Q. If you think that --- you know, you say that's all I can recall as I'm sitting here right now, I'm happy to take your ---.

A. Let's say that's all I recall as I'm sitting here right now.

Q. The drugs that you refer to that can make a substantial difference, probably PFOS and maybe PFOA, what drugs are you referring to?

A. Well, really an older one was cholestyramine, which used to be a pretty common drug. If you're as old as I am, you actually used to give it. It's not that effective for the condition we used to give it for. Now we give it for much rarer conditions. And it's sort of like kryptonite for PFOS. It just really does a good job getting rid of it. And I have actually published how well it works in the community. I got data on that that just happens to be there because we looked at a large population, as you know.

Q. That's in the C8 population?
A. Yes.
Q. Switching gears ---.
ATTORNEY WOLFF:
Let me just ask --- we've been going for a little bit more than an hour. I'm perfectly prepared to go a bit more unless anybody needs a break.
A. I'm good for now.
BY ATTORNEY WOLFF:
Q. Among other ailments, people have been experiencing kidney cancer, testicular cancer, prostate cancer, hepatitis, ulcerative colitis, osteoarthritis, gout, pregnancy-induced hypertension and asthma for hundreds of years and long before PFOA was ever synthesized.
Correct?
A. Yes. We didn't necessarily make those diagnoses, but, nonetheless, we can be pretty sure you're right.
Q. You are not offering the opinion that the levels of PFOA in the drinking water in the Bennington area is a cause of any particular disease in humans, are you?
A. I would prefer to answer that question in a very different way. It's --- I'm offering the opinion that it increases the risk of those diseases and I do not intend to get involved in people who are in the --- any

disputes about individuals who actually want to have their disease addressed in the legal setting on a personal level. But we do know about the increased risk, so I think I'm going to try to keep my answers to we know there is increased risk.

Q. Even on a population basis, the phrase increases the risk is not synonymous with the word causation, is it?

A. Again, causation, we're talking about individuals and increases the risk we're talking about a population.

If you want to say what is the equivalent word in the population that isn't increases the risk and you want to use we know it causes this in populations, then I would accept that, but I markedly prefer increases the risk because I don't like that confusion where somebody thinks that I'm advocating for an individual thing. We're talking about population findings.

Q. The word causation is often applied in scientific literature to talk about population-based exposures. For example, tobacco exposure is a cause of lung disease, asbestos exposure is a cause of mesothelioma and other examples like that.

Correct?

A. Yes, you're correct.

Q. And I guess my question to you is increases the risk is not synonymous with the word causation even at a population level, is it?
A. I prefer to use the word increases the risk. But if you prefer that I use the word causes, I can.
Q. It's not a preference. I'm just asking a question. Are they ---?
A. They don't mean the same thing precisely. I prefer to use increases the risk because it's a much more accurate population statement.
Q. The West Virginia University C8 website that you cite at the bottom of page seven of your report links to another WVU Health Sciences Center page entitled C8 and Clinical Conditions and Diagnoses.
Correct?
A. You're challenging my memory. I have to go to the website to be sure that it links to that.
Yes, that is the website of the Office of Research and Graduate Education and it's a WVU site.
Q. And when you said, yes, that was a result of me handing you Exhibit 8, which is entitled C8 and Clinical Conditions and Diagnoses.
Correct?

(Whereupon, Deposition Exhibit 8, C8 and

Clinical Conditions and Diagnoses, was marked for identification.)

A. Yes, that's correct.

BY ATTORNEY WOLFF:

Q. And in the first paragraph the WVU web page says that none of the relationships between diagnoses and corresponding population serum PFOA were C8 levels can be taken to show an etiologic or a cause and effect relationship or its absence without more work.

Correct?

A. Yes, that's --- this --- this was taken from actually something that we wrote in 2000 --- I'm going to say '07 or so, give or take a year, when we put the website up and reflected the current state of knowledge. And it's interesting to me that the Office and Research and Graduate Education still has that paragraph in there.

Q. As the WVU web page describes it, these data concern associations.

Correct?

A. Yes.

Q. And the WVU web page goes on to caution the reader that when it comes to causes, scientists interpret the preliminary data with deference to additional work that

need to be done.

Correct?

A. Yes.

Q. Now, let's take a look again at Exhibit 1, which is the August 2015 ATSDR CDC Tox Guide for Perfluoroalkyls. And please turn with me to the second page.

Under the heading health effects, which is in the third column, toward the bottom, the ATSDR states a large number of studies have examined the possible relationship between levels of perfluoroalkyls in blood and adverse health effects in workers, residents living near manufacturing facilities and in the general population. Although statistically significant associations have been found, the studies do not establish causality.

Additionally, the results were not always consistent across studies.

Correct?

A. It does say that.

Q. Do you agree with that statement?

A. No.

Q. Why not?

A. I think there is sufficient evidence to implicate a number of outcomes.

Q. What outcomes?
A. Well, should we go back to my report and --- or do you want me to try to do it from memory or what's the best way to go through this?
Q. If you need to refer to your report, refer to your report.
A. Okay.
The ones that we want to --- do you have a preference if I go through the ones that are the ones we're monitoring for or do you want to go through the list of outcomes that I think are established?
Q. The latter, the list of outcomes that you think are established. So if you don't think they're established, please don't recite them.
A. Okay.
So in my report there's --- I'll go from memory and then I'll go back to the report to make sure I haven't forgotten any. There's alterations in lipid metabolism related to cholesterol and LDL. There's alterations in uric acid metabolism. There's alterations in pregnancy-induced hypertension. There's alterations in liver functions. There's --- the mechanism behind those things together is highly likely to be steatosis, which is what's been found in multiple animal models, as has the elevated cholesterol of the animals if the

right animal is fed the right diet.

There are also asthma and there's the cancer outcomes, which include kidney cancer and testicular cancer. I think the Science Panel implicated prostate cancer as well. I'm kind of on the fence personally about prostate cancer, but it's something that probably would be a good thing to look for in both additional studies and in monitoring populations to the degree feasible. We didn't look for it in our proposal. And we can go down --- we can go through why we didn't do that at a later time unless you want me to start on that now.

Let me go and see what I'm forgetting.

Q. Please.

A. I have to find a place in my report.

ATTORNEY WOLFF:

Why don't we just go off the record and take a break.

VIDEOGRAPHER:

Okay.

Going off the record at 9:52 a.m.

OFF VIDEOTAPE

(WHEREUPON, A SHORT BREAK WAS TAKEN.)

ON VIDEOTAPE

VIDEOGRAPHER:

Back on the record at 10:01 a.m.

BY ATTORNEY WOLFF:

Q. Dr. Ducatman, is there anything you would like to add to your list based on a review of your report?

A. Yes, thank you.

Thyroid abnormality is something I've actually published about is --- is in the list of --- found in many studies.

I think I mentioned asthma already. There's an increasing evidence of lower birth weight. Not every study finds lower birth rate, but the more important thing that follows lower birth weight that's coming out in the literature now, which is not on my list and will need to be attended to in the future is the possibility, and it's not yet certain, of increased evidence of obesity or difficulty with weight loss. That's emerging literature. Shorter duration of breast feeding --- I mentioned steatohepatitis, I think. Excess ulcerative colitis. I can't recall if I mentioned that or not.

Q. But you would put that on your list of things that you believe have been established?

A. You're asking me about which one?

Q. Steatohepatitis --- all --- all of them, in fact ---
A. Okay.
Q. --- that you're now going through.
A. Yes. Yeah.
Steatohepatitis is --- is --- is a underlying mechanism which is seen in all of the animals, and it's --- it is the overwhelmingly likely explanation for the abnormalities of biochemical markers such as liver function tests and lipids and uric acid seen in humans.
Osteoarthritis, there's literature about fecundity. I'm a little uncertain about it at this point --- delayed time to pregnancy. I --- I don't want to add that to a --- a list of things. And then when it came to by --- following this list, when it came time to narrow it down to things that are really strong in the literature and that have medical monitoring and other things to recommend them, we have a shorter list of things we're doing for the --- we're proposing to do for the population.
Q. Are you done with your answer?
A. Yes.
Q. Do you subscribe to the principal that generally, researchers should be conservative when it comes to assessing causal relationships?

A. Yes.
Q. Is it fair to say in assessing causation, researchers first look for alternative explanations for the association, such as chance bias or confounding?
A. Right.
In fact, I've done a couple of papers that are along that line.
Q. At the top of page 15 of your report, you state that no one has been declared to have a PFOA associated condition by any formal body.
Correct?
A. Yes, I did say that.
Q. What does it mean when you say that no one has been declared to have a PFOA associated condition by any formal body?
A. There is no formal body that has said to citizens who are drinking contaminated water in Bennington, you have this condition. And therefore, under some formal agreement, you are said to have a condition that stems from this --- this exposure.
That --- that's --- for example, in contrast to what we have, for example, for Vietnam Veterans, where there's a formal body that says to them, okay. You have --- and picked whatever number of diseases. We needn't get into the specifics.

But there's a list of diseases where if you have that disease and you're part of a population where it's known that population has exposure to 2378-Tetrachlorodibenzo-dioxin, you will therefore --- it will be a --- a linkage will be made in a formal way between your previous exposure many years ago and your present condition.

Q. Would you describe the quality of the epidemiological evidence between cigarette smoking and lung cancer to be irrefutable?

A. Yes.

Q. Based on the published data, what is relative risk between cigarette smoking and lung cancer?

A. It varies a little bit. It's usually around 10 or 11, if there isn't another risk factor. It's --- so it's usually about a 10 fold increase.

Q. How would you describe the quality of the epidemiological evidence between asbestos and mesothelioma?

A. Also, you use the word irrefutable and I think --- I think that's a good --- that's a good example. And in addition, within my career and --- and not all that long ago, I can remember reading many studies from people who said well, the animals don't get mesothelioma like humans. Therefore, these human

mesotheliomas aren't caused by asbestos. I can remember reading more than a few articles like that.

And it just --- it illustrates a point you've made, that we sometimes can't find the problem in the animal until we do it right, and then they found it.

Q. Based on the published data, what is relative risk between asbestos and mesothelioma?

A. Again, you know, people can argue about the details and --- and I hope you'll give me some leeway on the details, but it's usually around five. It's usually considered --- mesothelioma, not lung cancer.

Q. Mesothelioma.

A. Oh, boy.

For --- for mesothelioma, that depends on how you do it. But if you look at the cause, I mean something like 70 to 80 percent of all mesotheliomas have asbestos in their background. And we sometimes think we just missed the others, but the --- the relative --- mesothelioma is a disease of people who have been exposed to asbestos. And I don't remember the exact number. I apologize. I thought --- I --- I incorrectly heard lung cancer where we know the number. Mesothelioma, it's very high, but I don't know the number.

Q. Can you compare and contrast the quality of the

epidemiological evidence between cigarette smoking and lung cancer with the body of data on PFOA exposure and kidney cancer?

A. Yes.

The --- we've been going for so many more years about cigarettes, and lung cancer is so much more a common condition. And the absolute certainty for lung cancer is --- is not the case for PFOA and kidney cancer. It is at this point, more likely than not. The data support it. However, it --- it is reasonable to believe that additional data could refute it in the future. That is the nature of --- of epidemiologic studies in humans.

Q. Compare and contrast the quality of the epidemiological evidence between cigarette smoking and lung cancer with the body of data on PFOA exposure and testicular cancer.

A. There's a little bit more for testicular cancer, including a lot of physiologic evidence. But the same general answer pertains. It's not nearly as strong for testicular cancer as it is for cigarette smoking. It's just nowhere near as --- as strong.

Q. Compare and contrast the quality of epidemiological evidence between cigarette smoking and lung cancer with the body of data on PFOA exposure and

steatohepatitis?
A. The animal data are irrefutable. Animals get steatosis when you give them PFOA, and they do it routinely and they do it regularly. And I --- I'm thinking that that's undisputed. I --- I would defer to a toxicologist who can find someone who disputes it, but I --- I believe it's undisputed.

In humans, because we're not going to liver biopsy in person after person, and frankly won't be doing that, what we have in humans is the animals do it and the human biomarker data line up with it. And therefore, it looks like that's the underlying mechanism that --- that starts steatosis.

In addition, there are emerging marker studies in human that show that both the DNA markers and the immune markers and the cell damage markers line up with steatosis. So it's pretty strong, but it's not at the same level of --- as cigarette smoking and lung cancer and --- and it may never be, because we're not going to go in and do liver biopsies until people are very sick.
Q. Are you or are you not recommending medical monitoring for prostate cancer in males in this case?
A. I'm not.

That doesn't mean that in some future thing, we'll know some reason to change our minds. But at

currently, my --- my sitting down, thinking about it and going through all the processes, I'm not recommending it.

Q. Are you aware of any statement in the peer reviewed scientific and medical literature which reports that PFOA is a cause of kidney cancer in humans?

A. I'm aware of a statement that says it's linked. I'm aware of a statement that describes linked, but I'm not aware of a statement that says it's a cause.

Q. Okay.

Are you aware of any statement in the peer review scientific and medical literature which reports that PFOA is a cause of testicular cancer in humans?

A. Same answer.

Q. Are you aware of any statement in the peer reviewed scientific and medical literature which reports that PFOA is cause of steatohepatitis in humans?

A. I have to think about that pretty carefully. There are statements that DNA markers are there. There are statement that the biomarkers are there. There are clear statements that the animals get it. And my memory is not good enough to say yea or nay if somebody has said we think, you know, it's in humans. It's ---

it's the consensus explanation at this point for what underlies these biomarker abnormalities that are in humans, and that I recommend we follow.

Q. Are aware of any statement in the peer reviewed scientific and medical literature which reports that PFOA is a cause of any particular disease in humans?

A. I --- I think that if we look at the literature, if it doesn't say that PFOA is causing people to take more --- to need to take more medication for lipids. I --- I believe the literature actually states that very clearly and that's a code of diagnosis. So that's the one where, you know, depending on what you mean by statement, I think the answer could be yes or no depending on how you define statement.

I think there's emerging literature that you are more likely to be diagnosed with gout. So again, you know, depending on what you say is a diagnosis, I think it could be there. And I think when you look at the differences, if it doesn't already say that, you know, it's a question of when it will.

I think it probably does say something like that for cholesterol and it may already for gout. But if it doesn't, it will soon. And I think it's more likely than not for the others, but I'm not aware of statements because the literature is slimmer.

Q. Okay.

Based on the published literature, can you identify the doses --- the dosage of exposure to PFOA in terms of concentration and duration that is required before you would expect to see signs and symptoms of gout?

A. I haven't seen the dose response curve, so I can't --- I mean I --- I --- I looked at that in literature we published. But that literature was not adequate to say we know that we have this threshold or there is no threshold.

Okay? We --- I --- I don't think there were enough cases for hyperuricemia to do that. And that --- that's hyperuricemia and not gout literature. For the emerging gout literature, I don't know the answer to your question.

Q. Based on the published literature, can you identify the dosage of exposure to PFOA, in terms of concentration and duration, that is required before you would expect to see signs and symptoms of the lipid and cholesterol abnormalities that you described a moment ago?

A. Yes. We --- we actually do have that in the literature, and you can see it in the --- in the exposure responses in several papers where --- you can

look at the figures. And they're --- actually, an issue is that, you know, you don't know what the lower threshold is because it was kind of defined by the technology at the time in a large population. But we can't see --- if you go from two to five, you can start to see it.

Q. Two to five what?

A. So those are nanograms per liter --- micro --- usually, human reporting doses --- and I always have to look them up because that's a weakness I have. So it's --- it's a really small number. It tends to be about --- you know, if people are drinking water at a steady state, it tends to be about a tenth of what's in their drinking water. But as you correctly pointed out, there are huge variations around that mean.

Q. And what's the duration of the exposure? So you gave me the concentration.

A. Right.

Q. What's the duration?

A. You know, we don't know the answer because people have been drinking this stuff for different periods of time. But I'll tell you this, you can see it in children. So it can't be all that long. It takes ---you don't --- you don't see it in the youngest of the young children. In fact, what you actually see is

opposite at first, it looks like, although we're not sure of that. And then it turns around and the kids begin to go up. So it's not vast amounts of time and I can't give you a more --- a better thing except to say we do see it in children.

Q. Okay.

Just want to talk for a moment about regulatory risk assessments.

While everything is toxic at some dose, the exposure levels calculated in a regulatory risk assessment do not tell you what that dose is.

Do they?

A. It's an interesting question because it poses the issue backwards. So the usual way a risk assess --- let's stipulate I'm not a risk assessor.

Q. Okay.

A. I work with information from risk assessors. I would be a terrible risk assessor.

What risk assessors do very basically, is they find a threshold dose.

Okay? Which is very responsive to your question. So they say in the literature right now, this outcome at this dose is the lowest thing we see.

Okay? And that tends to only get lower over time. It's very rare for that ever to get higher for a toxin.

New information comes out, it gets lower. And then based on that dose and based on the route of exposure and based on the outcome and based on something called uncertainty factors which has to do with how much information we have, you come up from that to the regulatory issue.

Now the regulatory number is the outcome of that. It's not the precipitating cause of those numbers. You asked the question sort of backwards to that.

Q. Given the methods, the assumptions and the safety factors that are used in regulatory risk assessments, the permissible exposure levels that are calculated are intended to be protective and not predictive.

True?

A. Yes.

Q. Given the methodology assumptions and safety factors that characterize regulatory risk assessments, the permissible exposure levels do not provide predictive information about actual clinical risk or medical causation for exposures that exceed such levels.

Do they?

ATTORNEY WHITLOCK:

Object to the form.

A. Yeah. Again, that's the same --- it's the same

backwards formulation. So the --- the --- the regulatory level is not predictive. However, depending on the type of data that's available, some of the data can be. It depends on what's available.

BY ATTORNEY WOLFF:

Q. In your report, you do not recite any point estimates, relative risks or confidence intervals for any health end points including kidney cancer, testicular cancer, asthma or steatohepatitis.

Do you?

A. That's correct.

Q. Why didn't you recite any of those in your report?

A. They're --- they're in the literature. The literature is referenced, and I just didn't think that there was a need to add to what's in the literature beyond the --- beyond the findings that are there.

Q. Beyond providing summary statements, some of which are as short as one word and some of which are up to two sentences, you do not discuss, analyze or explain the methodological limitations or the particular data from any of the studies that you cite through endnotes on pages five and six of your report.

Do you?

ATTORNEY WHITLOCK:

Object to the form.

A. Could you repeat the question?
BY ATTORNEY WOLFF:
Q. Sure.
You do not discuss, analyze, or explain the methodological limitations or the particular data from any of the studies that you cite through endnotes on pages five and six of your report.
Do you?
A. No.
Q. Why not?
A. I didn't think it was needed. We were dealing with excess risk, and the excess risk is present and I thought that was what I was asked to do.
Q. Asked to do by whom?
A. By Plaintiff's attorneys.
Q. The studies that you cite on pages five and six of your report are not the totality of the published studies from PFOA exposed human populations on each of those end points.
Are they?
A. No, there's probably another group of studies. It's --- it's a lot of them. At some point, you run out of gas. Some of them are not that relevant because they studied the wrong population or at the wrong dose, but there are others.

Q. Are the particular studies that you cite for each of the end points listed on pages five and six of your report, the studies that you think support your opinions?
A. In some cases, they're not fully supportive. In many cases, they are supportive. And there are other studies in some cases that are supportive. And studies that I thought were less important, I didn't include.
And then you're asking, I think, about studies that are not supportive. And there some in the literature, and I didn't include them. And for the most part, I don't think that they're very relevant either.
Q. Let me just frame the question.
Do you cite the studies containing data that do not support or are inconsistent with the propositions you advance on pages five and six of your report?
A. Actually, some of these are in some ways inconsistent.
Q. How is that?
A. They don't always show that the --- that the dose response curve is exactly the same way we found it.
Okay? There are differences in the dose response curve. There are differences in which perfluoroalkyl substance is the most powerful. It's often the one that's sort of a rule of thumb. It's not always true,

but it's often true.

At the higher dose --- when you get into the higher dose populations, the dominant perfluoroalkyl substance is the one that looks like it's the baddie, and other is less, which may be consistent with a --- saturation mechanism, some people think. But we don't know.

So it's --- they're --- they're --- they're not --- you know, it's --- it's not always fully supportive, but I also didn't cite, to be clear, the ones that I think were less important, the ones that were out in the way upper range of the exposure where it tends to attenuate. It still goes up, but not enough that you can see it in the size population that it was done, things like that.

Q. What were the inclusion and exclusion criteria, if any, for the studies you cite on pages five and six of your report?

A. I thought they were the best in class.

Q. What method did you use to reach the opinions in your report?

ATTORNEY WHITLOCK:

Object to the form, vague and ambiguous.

A. The way we --- you're asking me about a literature search strategy?

BY ATTORNEY WOLFF:

Q. However you would describe it, so that's a pretty broad question, but it's the one way I know how to ask it. What method did you use to reach the opinions in your report?

A. So for each of these questions, there is a --- a literature. That literature came almost completely --- there are a couple of exceptions we found in the United States National Library of Medicine where you can use specific search terms with specific operators to find --- or everything or to narrow down on the thing you want.

You pull up all of those and you look at the ones that address the question that you're asking, and then you cite the ones that you think are the best within those groups.

Q. Anything else?

A. I --- I absolutely think there are other things that I do as a matter of intuition, but you may have to ask me a more specific question for me to tell you what else you --- you mean in your very broad question.

Q. The phrase consistently established does not have any recognized or generally accepted definition in the medical and scientific community.

Does it?

A. I --- I don't know the answer to that. I'm not

aware that it does, so we'll leave it at that.
Q. Fair enough.
In your opinion, how long would a person have to drink water containing PFOA to be at a significantly increased risk of a serious latent disease?
A. That's ---.
ATTORNEY WHITLOCK:
Object to the form.
A. That's actually an important question, and I don't think it's just like a few weeks, even if it's a high dose. I --- based on the physiology, it looks like it's got to be for a period of time.
Okay? You know, you could --- any time period you pick is arbitrary. If you say it's 365 days, someone will argue it's 364 and someone else will say it's 366.
But I don't think that if you drink a bunch of PFOA all at once --- you know, may make you sick. You know, you may not feel good for a day. I don't think that's what we're looking at in the people who have abnormality. I think it takes time to develop, even at high dose.
BY ATTORNEY WOLFF:
Q. Right.
So I'm not asking you to debate with anybody else at the moment. And I know that you said that there were

some would say --- you 365, someone else will say 364.

Okay? Let's put those folks aside. In your opinion, Alan Ducatman's opinion, how long would a person have to drink water containing PFOA to be at a significantly increased risk of a serious latent disease?

ATTORNEY WHITLOCK:

Object to the form.

A. The --- the --- the question is --- is unanswerable because of course, we don't know.

Let's --- let's do it as a practical answer. If I were to choose a cutoff based on what we do and don't know and --- and in terms of how long we mostly don't know, I would choose a cutoff of a year.

Okay? That's just a practical matter because I don't think --- you know, let's say that something goes wrong and one of the products that you're using gives you a really big bolus of PFOA. Well that's not how people bioaccumulate. And --- and this is about bioaccumulation in people, and bioaccumulation is something that takes time and invokes our own metabolism. And so I know it's not a day. I don't think it's a month, so I chose a year.

Okay?

BY ATTORNEY WOLFF:

Q. If there is a risk associated with drinking water with PFOA, then the risk is different from individual to individual because their consumption of water is different.

Correct?

A. Well that's one way to look at it. But the other way to look at it is we can measure the bioconcentration in people and at that point, it's their bioconcentration.

Q. Assuming there is a risk associated with PFOA exposure, if you were to look at any individual class member among the thousand or more individuals in this proposed class, the risk to that individual is going to be affected not only by the amount of water, but also by the amount of PFOA in the water he or she has consumed.

Correct?

A. Yes, that's correct.

Q. Is it fair to say that the risk of disease, if any, is not proportional to the difference in the amounts of water consumed because different individuals have different susceptibilities to PFOA based on their medical conditions and other behavioral factors ---?

A. I --- I think you're right. But the question is pretty the long, so could you repeat it? Just ---.

Q. I want you to be sure.

Is it fair to say that the risk of disease, if any, is not proportional to the difference in the amounts of water consumed because different individuals have different susceptibilities to PFOA based on their medical conditions and other behavioral factors?

A. Well I ---.

ATTORNEY WHITLOCK:

Object --- excuse me.

I'm going to object to the form to the compound question, and it's vague and ambiguous.

Now you may answer.

A. The --- the first part of that actually, now that I've heard the whole thing, so there's about two to three different questions in there, and one piece of it is wrong.

BY ATTORNEY WOLFF:

Q. Which piece is wrong?

A. The --- the bit about the concentration in water. You should repeat that because it doesn't make sense.

If you read the whole question, I'll write down the part that doesn't make sense.

Q. Okay.

Is it fair to say that the risk of disease, if any, is not proportional to the difference in the

amounts of water consumed because different individuals have different susceptibilities to PFOA based on their medical conditions and other behavioral factors?

A. Okay.

So ---.

Q. So what part --- what part did I get wrong?

A. It --- it's --- I'm trying to parse the double negative.

Q. Okay.

A. And there is a double negative in there.

ATTORNEY WHITLOCK:

There's a double negative, there's four questions. There's ---.

A. Yeah.

But when you say it's not proportional --- and I'm paraphrasing, I may not have it exactly --- not proportional to the difference in the amount of water consumed --- well actually, the dose --- the exposure dose is going to be --- people will have different concentrations in their serum, but the exposure dose will be proportional.

So your --- your question has an incorrect piece in the middle of it that makes it's just --- or not --- maybe misleading or difficult, and so you --- you should probably just ask that question because you may

mean something important. But you --- you can't do that proportion thing where the dose in the water somehow doesn't matter.

BY ATTORNEY WOLFF:

Q. But the dose in the water does matter because ---

A. Right.

Q. --- because there are differences from well to well to well.

Right?

A. Right.

That --- but your question don't say that.

Q. Is it fair ---?

A. Your question's got the double negative in there that doesn't say that when you parse it.

Q. Okay.

I'm not sure where the double negative is, but I --- I think we've spent enough time on this one.

Is it fair to say that individuals who are not exposed to PFOA through their home's water supply because for example, they're hooked up to the municipal water system in Bennington, do not have that component of PFOA in their PFOA body burden. And thus, their risk of exposure, if any, is less than those individuals who have PFOA in their home's water supply?

A. It's mostly correct, but it will be incorrect in

some cases. And so --- so if you look at the C8 health study, if you worked, if you went to school --- so I don't have any information that any business was on a well. I don't have any information that a school was on a well. But since I don't have that information, the point isn't where you live, so much as were you in a place where you drank the water for a substantial period of time?

And so your question is mostly correct.

Q. Is an alteration in a biochemical marker itself a clinical pathology?

A. So you --- you were good until you used word pathology, which is usually histopathologic. But let's use the word clinical disease.

Okay? And then the answer is, it depends. So it depends on the marker. Some of them, they're only markers of disease. And some of them, they are the disease, so it depends.

Q. Fair answer.

In --- in your opinion, are small but statistically significant increases in liver biochemical tests clinically significant?

A. Good question. I like that one.

Not necessarily in one individual at one time.

In populations, they are very significant for

indicating what's going on and that's where they become very useful in a population. And then you can go back and use them for screening. Also there's increasing information that you can use them for screening.

So let's take the normal cut office of ALT. Okay? Which is a liver biomarker. And say the normal cutoff at my lab is 40 or 50, choose whichever one you want. And say that my number, my personal number, is 30. So I'm clinically normal. What that means is that I'm within the distribution of 95th percentile. It doesn't say much about my liver.

Now we start to get interested in the past five years about the --- the epidemic of steatosis in our society, something like more than 20 percent and fewer than 40 percent already have steatosis. Looks like this increases the risk associated mostly with obesity.

If you no longer go by 40 and you take other cutoffs, people are finding this very useful. Okay? So the population research actually led to reevaluation of the marker.

Q. In your opinion, does every instance of an abnormal liver biochemical test constitute a disease?

A. No.

By definition ---- you --- you know the answer to that. By definition, an abnormal liver biochemical

test isn't a disease. And furthermore, even one abnormal cholesterol test isn't a disease. We have to be sure that you're going to do it frequently before we start to treat you for your high cholesterol.

Q. Right.

So if you're going to be put on a statin, most physicians would want to see a second cholesterol test?

A. Most would.

Q. Similar results?

A. Yeah, most would.

They might not if --- you know, they might not if --- if your --- if your --- if your whole family had just died at a young age. But most of the time, they would repeat it and that would be a prudent thing to do.

Q. And once they've got the repeat test, they put you on a statin and pretty much you're taking a statin for the rest of your life.

Right?

A. Until you get disgusted with taking it and stop, which is one of the problems.

Q. Got it.

At the bottom of page three of your report, you state that the mean background blood serum level in the U.S. population of 2.1 micrograms per liter.

Right?
A. At the --- yes.
That --- that --- that was the mean background level circa --- I'm trying to remember the time, but it's one of the NHANES reports.
Q. Yeah, 2011 to 2012, that was the geometric mean.
Correct?
A. That's correct. That sounds correct. I think you're right about the years.
Q. And we'll go through them.
In the second paragraph of Page Nine of your report you make reference to Bennington residents who have above background levels of PFOA in their blood.
Correct?
A. Yes.
Q. I'm not fussing when you say this, but your report does not actually specify the cut point for what you consider to be background levels of PFOA in blood.
Does it?
A. This report or the other one? I don't remember, but if it --- if it doesn't I was thinking about 2.1 at this time.
Q. So for purposes of your opinion in this case what do you consider the cut point to be for background levels of PFOA in blood?

A. Well, since I wrote this report NHANES published another. And there was a --- a disappointingly small decrease --- I mean, it's actually --- people are not coming down the way we hoped. But there is a tiny decrease in --- you're going to test my memory here. I think it's like 1.96 now.

If I'm off by, you know, a couple hundredths I apologize, because --- but I did the report at 2.1 and, you know, that's what I was thinking when I did the report.

Q. Then let's use 2.1 as the --- as the cut point.

Okay? I just --- I need to have a sort of a common thing to point to. 2.1 is what you intended when you wrote your report?

A. When I wrote that report I intended 2.1.

Q. Okay.

So when you wrote your report and you made reference to Bennington residents who have above background levels of PFOA in their blood you meant residents who have greater than 2.1 microliters of PFOA in their blood.

Correct?

A. That's what I meant when I wrote the report honestly.

Q. And then --- yeah, okay.

And then in the same paragraph on page nine of your report you go on to assert that, to a reasonable degree of medical certainty a medical monitoring program is clinically necessary for this population to detect known PFOA-related adverse health effects as early as possible, in order to minimize disease and improve health outcomes. That's what you wrote.

Correct?

A. Yes, that sounds right.

Q. So to be clear, your inclusion criteria for what you describe as a clinically necessary medical monitoring program is anyone who has more than the NHANES background levels of 2.1 microliters of PFOA in their blood.

Correct?

A. It's actually not that simple. But what I thinking --- but that's a fine cut point.

Q. What were you thinking?

A. It just so happens as we've already discussed that if you look at the large population profiles for lipids and perfluoroalkyl substances you can see the --- I mean, it may happen lower. Actually it looks like it happens lower if you look at the curve.

You probably assume it happens lower, but you can't see because the technology wasn't there. But if

you go from two to five it goes up.
Q. How can one tell which Bennington residents do or do not have more than 2.1 microliters of PFOA in their blood?
A. I personally can't look at you and tell what your perfluoroalkyl substance is by --- by any means other than by testing.
Q. So each individual living in Bennington would need to be tested to determine whether they have more or less than 2.1 microliters?
A. Well, we've already had a little bit of this confusion about all of Bennington versus the people who have contaminated water.
Q. Okay.
A. So let's --- let's stick with this population.
Q. Okay.
This --- so --- fair enough. So in order to determine who in this population has more than 2.1 microliters of PFOA in their blood each individual would need to have a blood test?
A. I think many have had, but perhaps not all. And it would be very appropriate to test folks to find out. You know, you --- there's one other way to look at it and I know epidemiologists who actually prefer the models --- and the thing --- the nice thing about the

model from an epidemiologist's perspective is you can start looking at the thing that you already mentioned, which is the variation in the water. Very likely it was higher at some time, but maybe it wasn't. Maybe, you know, we have to model it and you get some idea of what was in their blood over time.

Because I'm a clinician I'm very comfortable with the idea. We measure it in your blood and that integrates your exposure and that's your exposure. Because it's very concrete. I don't have to deal with a whole lot of math where people can argue.

Q. Let's take a half step back, just a general question. You are aware that NHANES periodically conducts and publishes the results of blood sampling.

Correct?

A. Yes.

Q. Is it fair to say that NHANES collects and publishes data on human exposure to some 265 environmental chemicals?

A. I don't know the number, but I'll take your word for it.

Q. Fair enough.

A. And, you know, the --- the chemicals vary by the way, even within the PFOA substances from test date to test date.

So it's not like it's this --- you mentioned 265. It's not like you could say in 2004 it's the same chemicals as in 2011 or 2014.

Q. And I'm just going to get into that. Okay.

(WHEREUPON, THERE WAS AN OFF RECORD DISCUSSION.)

BY ATTORNEY WOLFF:

Q. Dr. Ducatman, Exhibit 9 contains the PFOA blood data tables from the February 2015 NHANES Fourth National Report on Human Exposure to Environmental Chemicals.

(Whereupon, Exhibit 9, February 2015 PFOA Blood Data Tables, was marked for identification.)

BY ATTORNEY WOLFF:

Q. Please turn with me to page 338, which is the last page on this Exhibit, which contains the sampling results for PFOA from 2011 to 2012. Are you there?

A. Yes.

Q. And in the top line the geometric mean for the total sample is 2.08 micrograms per liter, which rounded up to the first decimal is your number of 2.1

micrograms per liter.
Correct?
A. Yes.
ATTORNEY WHITLOCK:
Object to the form.
A. I --- I --- I already mentioned that I might be a couple hundredths off, but I just --- you you have to remember a number.
BY ATTORNEY WOLFF:
Q. I'm not fussing at you. I just want to make sure we're talking about the same data set.
A. Right. It's --- and it's a geometric mean and not a mean. And you may have said mean, which I didn't catch at the moment. But in any case it's --- it's a median. It's a --- it's a central tendency.
Q. Okay.
And please turn to page 336 which contains the sampling results for PFOA from five different surveys taken between 1999 and 2010.
Correct?
A. Yes.
Q. And with the exception of the 2007 to 2008 sampling period in each successive survey the geometric mean is going down from the prior survey.
Correct?

A. Yes.
Q. And so for 1999 to 2000 the geometry metric mean was 5.21.
Correct?
A. Yes.
Q. For 2003 to 2004 the geometric mean was 3.95.
Correct?
A. Yes.
Q. From 2005 to 2006 the geometric mean was 3.92.
Correct?
A. Yes.
Q. From 2007 to 2008 the geometric mean was 4.12.
Correct?
A. Yes.
Q. And from 2009 to 2010 the geometric mean was 3.07.
Correct?
A. Yes.
Q. And as we know for 2011 to 2012 the geometric mean was 2.08.
Correct?
A. I think that's right.
Q. Now since your inclusion criteria for what you say is a clinically necessary medical monitoring program, is anyone who has more than the background of 2.1 micrograms per liter you would say that millions and

millions of Americans should have been getting this medical monitoring as a clinical necessity in 1999 to 2000 when the background level was 5.21, which is two and half times higher than 2.1.

Correct?

A. Yeah.

ATTORNEY WHITLOCK:

Object --- object to the form.

A. It would have --- your question is, would it have been desirable for these people to ---.

BY ATTORNEY WOLFF:

Q. Have that medical monitoring program?

A. Yes, it would have been.

Q. And the scientific data do not demonstrate that 2.1 micrograms per liter of PFOA is a threshold dose for causing any disease in humans.

Do they?

A. You mean, it could be lower? It could be.

Q. The scientific data did not demonstrate that something less than 2.1 micrograms per liter of PFOA is a threshold dose for causing any disease in humans. Do they?

A. We don't know that. Right. Yeah, correct.

Q. Okay.

Now let's use the 1999 to 2000 geometric mean as

an example. The scientific data do not demonstrate that 5.2 micrograms per liter of PFOA is a threshold dose for causing any disease in humans. Do they?
A. What we know about 5.2 is that we can see that your cholesterol goes up. And we also know that the very assiduous search for confounders has been made in multiple ways and not found. We also know that the right animal fed the right diet will get the same result.
So I believe that it's much more likely than not that we do know that people are more likely to need to take lipid lowering medications at that dose.
Q. Other than being an average background level 2.1 micrograms per liter of PFOA has no established clinical significance. Does it?
A. For environmental chemicals we just generally don't say that a level has a clinical significance. We --- we --- there are regulatory significances. And sometimes they're --- they're, you know, well known like, you know, the cut off for children in lead. And there are regulatory --- so that's a biomarker. And there's regulatory thresholds for exposures. But we don't say that if you're above this level even for something as toxic as lead that we know you're going to be sick.

Q. Other than being an average background level 2.1 micrograms per liter of PFOA has no established scientific significance. Does it?
A. Well, again what we know is that when you go from two to five you can see in both adults and children that the serum lipids are going up.
We also know that --- here's the neat thing, if you take a population where it's going down serum lipids are coming down at --- I mean, you have to model against age. You have to do that because as we age our lipids get worse but the cholesterol and LDL are getting better when it comes down --- and that study's been done too.
Q. When considering risk are dose and the attendant hazard important factors?
A. Yes.
Q. Dr. Ducatman, Exhibit 10 is a transcription of the ATSDR/CDC's January 2017 PFAS Continuing Education for Clinicians, which is available on video through the ATSDR's website and which contains subtitles.

(Whereupon, Exhibit 10, January 2017 ATSDR/CDC Transcript, was marked for identification.)

BY ATTORNEY WOLFF:
Q. And to be clear, our word processing department prepared this transcription off of that video and its subtitles. I just want you to understand how this document came to be.
Okay?
A. Thank you.
Q. And if you would please turn with me to page 28?
Are you there?
A. Yes.
Q. As recently as 2017 the ATSDR/CDC has told clinicians that there is no health screening recommended because of exposure to PFOA.
Correct?
A. Right. They're going --- there are no official guidelines.
Q. And please turn with me to page 27. And we're going to take this in stepwise fashion.
Okay? Are you there?
A. I'm here.
Q. Okay.
As recently as 2017 the ATSDR/CDC has told clinicians that PFAS are ubiquitous in both the U.S. and globally. There are no specific biomarkers of health effects caused by or linked to PFAS blood

concentrations.

The presence of PFAS in blood testing only confirms exposure, which is present in greater than 95 percent of the U.S. population, based on representative samples from NHANES studies.

Correct?

A. That's what was written there.

Q. Do you agree with that statement?

A. I agree with parts of it.

Q. What parts do you not agree with?

A. When they say there are no specific biomarkers of health effects I'm not sure I know what they mean. If they --- if they mean that PFAS is not linked with elevated total cholesterol that literature is pretty clear that they're wrong. So it's unclear to me what they mean by that.

What I agree with is the statements that PFAS are ubiquitous in both the U.S. and globally. If there are places where people don't have PFAS in them it's got to be both a pretty remote place and a place where people aren't eating any seafood because PFAS gets into certain types of seafood --- various PFASs get into certain types of seafood. So in places as remote as the Faroe Islands, people have PFAS in them.

And the presence the PFAS in blood testing only

confirms exposure which is present in 95 percent of the U.S. population based on representative samples. And I agree with that, the presence confirms exposure. But I don't know what they mean by only.

Q. Let's continue. The ATSDR/CDC further states that, while higher blood concentrations of PFAS suggest larger exposures PFAS blood concentrations cannot be linked to any specific health effects. And results obtained from testing patients blood PFAS concentrations would not guide medical decision making.

Correct?

A. It does say that.

Q. And the ATSDR further states that, even if a patient is identified as having an extremely high PFAS blood concentration this does not mean he or she will suffer from any adverse health effects.

Correct?

A. It says's that, yes.

Q. Do agree with that statement?

A. Which one?

Q. Either of the two that we just read.

A. Okay.

I --- I agree with the second one. It is possible to have a very high PFAS serum concentration and nothing bad may happen. That --- that is certainly

possible. And we know that from other environmental exposures. You can work with dioxin and not get one of dread diseases. You can smoke cigarettes and lead a long life. It's unwise, but you can do it.

The one I disagree with and you anticipated this, is that they cannot be linked to any special health effects. I actually think the literature is very clear and I think that this statement's going to be a black eye for ATSDR. And it's only a matter of time before they get tired of trying to defend it.

ATTORNEY WHITLOCK:

Just so the record's clear I'm just going to object to the inference ATSDR and CDC continue, given the transcription. I don't --- I --- I certainly am not questioning that it was accurately transcribed. I just have no way of verifying that.

You could --- Counselor, you're welcome to read --- read from it and ask Dr. Ducatman whether he agrees or disagrees and --- and you can --- and you're welcome to continue attributing it ATSDR/CDR. But I just wanted to make that clear on the record.

ATTORNEY WOLFF:

Okay. And we noted the link on the first page.

BY ATTORNEY WOLFF:

Q. Okay.

Dr. Ducatman, let's just finish with this page. The ATSDR/CDC further states that, likewise patients with mildly elevated PFAS blood concentrations are not immune from exposure-related health risks.

Management of patients exposed to PFAS should be guided solely by patient symptoms and findings derived through a health history and physical examination.

Correct?

A. Yes, it say's that.

Q. Do you agree with that statement?

A. So there's two statements there. Let's go --- is it okay if I do them separately?

Q. However you wish.

A. Thank you. So patients with mildly elevated blood concentrations are not immune from exposure-related risks, with the exception that they shouldn't have used word immune. Because immune means something else.

I agree with the direction they're taking that statement. You --- you --- if you are exposed you can have health outcomes. That's what they're saying. They're just saying it in the negative. And they shouldn't have used the word immune.

By the way, if I forgot to include immune in my first list of things I should have. You just reminded

me. Because we know that ---.
Q. So I just ---- so the record is clear, what is your first list of things?
A. Yeah, immune is on it.
Q. No, no. No, what --- what --- what were you intending to describe on your first list of things?
A. Yes, that was the question that you asked me. And I can't remember if I added immune. But if I didn't it should be there.
Q. Yeah, but are ---?
A. There are immune --- there are immune findings.
Q. Okay.
Now let me --- let me ask it this way. Are immune findings findings that you would say have been demonstrated in humans?
A. Yes, absolutely.
Q. Okay.
A. There's zero doubt to that at this point.
Q. I just wanted to get clarity on what we were ---?
A. Yeah, and if I --- if I forgot I apologize.
Q. Yeah, I ---.
A. There's no doubt of it. It's --- it's kind of, you know, when you're on a seat for like more than an hour you just, you know --- sometimes you just don't remember everything. But back to this.

Q. Okay.

Back to this. I'm not fussing at you. Are you done with your answer on page 27 or ---?

A. No.

Q. Okay. Then please continue.

A. There's a second sentence there.

Q. Okay. Go ahead.

A. Management of patients exposed to PFAS should be guided solely by patient symptoms and findings derived from a thorough health history and physical examination.

And here I --- I mostly agree. Because what they're talking about when they use the word management is they're talking about what happens between you and your doctor. Okay?

But somebody reading this sentence could infer that your doctor actually knows what to do with PFAS levels. And actually we know that's not the case. And so it's --- it's got to be also based on what we find out about your exposure. And then will your doctor know what things to think about? Not necessarily. And that's true. You know, that's not a critique of anybody. There's plenty of things that --- I'm doctor that I don't know --- I know in my area other doctors know things in their area. And the good thing that you can

do is to help them --- direct them to the things that they should --- they should have information about. And that can be done easily and cost-effectively ---

Q. Yes.

A. --- you know.

Q. And --- and --- and --- and the issue of PFOA exposure in the water in Bennington has been the subject of countless reports in the news media, whether in newspapers or television reports.

Correct?

A. That's right.

Q. And is it ---?

A. Countless is wrong, but many.

Q. At some point somebody could count them up, but it would be a lot.

Right?

A. It would be plenty.

Q. And is --- is it fair to say that members of the medical community in Bennington area are conscious of these issues?

A. I assume they're conscious of it. I assume they know that this is an issue their community.

Q. And --- okay.

So we're done with page 27. Please turn with me to page 32. And let me know when you're there.

A. I think we were here before.
Q. Maybe. The ATSDR/CDC states that more than 95 percent of the represented U.S. population has measurable blood levels of PFOA and PFOS. The presence of these PFAS in blood only confirms exposure. This does not mean your patient will suffer any adverse health effects. Routine blood tests for PFAS cannot be extrapolated to any specific health effects and cannot guide medical decision making.
Correct?
A. It says that.
Q. Do agree with that statement?
A. PFAS tests alone should guide medical decision making. They're correct. A PFAS test alone cannot guide medical decision making, with one possible exception but it's one that would be up for debate. Do you want to discuss that one?
Q. If you do.
A. You asked me the question, so it's up to you.
Q. Okay.
I'm just --- I was asking you if you agree with that statement. And if you disagree with the statement ---.
A. There's --- there's one detail in which this could be wrong in some clinicians' eyes and I don't think

it's important. And I asked you if you want me to go over ----.

Q. Okay. If it's ---- if it's not important then let's not discuss it.

A. Okay.

Q. Is it fair to say that because biomonitoring sampling results for PFOA cannot predict current or future health outcomes or diseases the results are not clinically actionable?

A. Okay.

So we're back to that same thing. Usually the results themselves are not --- PFOA, PFOS, PFNA, PFHxS, any one of them, they alone are not clinically actionable, with that one exception. It's probably --- just --- let's get it out there so that it's --- it's --- you'll understand that it's not --- that I said I'm trying to be accurate. And that is that some doctors, and it's not a majority, think that we should be doing things to get the ones out of people's bodies at a more rapid rate where we have medicines that can do that.

And it's certainly a consideration. It's a legitimate consideration. I think it's a research question rather than a clinical question at this point. So in my mind it's not a clinically actionable thing to do. But I know some patients really want it done.

Q. Okay.

Let's turn back just for a moment to the average blood levels of PFOA. Merely having a blood level of 2.1 micrograms per liter of PFOA is not necessarily a risk.

Is it?

A. Yeah, it is. I'm sorry. It's --- it's a risk.

Q. Why do you say that?

A. It's a toxin, it has activity. And you don't want that activity in your body. I don't want it in my body. It is a risk. And not only that, it's a risk at which you go above that level just --- you know, start moving up the chain. And we know that we can see that you have higher cholesterol and LDL cholesterol in pretty large studies.

And we also know that when people decrease from those levels on average --- pick your levels --- as people come down, your LDL and total cholesterol come down in at least one study.

So I actually think it is a risk. You don't want it in your body. It's an inappropriate thing to have there. It is a known toxin and it is a risk.

You may be asking the question in a different way, in which case you should rephrase it.

Q. What do you have in mind?

A. Okay.

You may be asking me about if you have this do we know the relative risk of testicular cancer. In which case --- which you already asked. In which case the answer is no.

Q. Bear with me just a moment. I just need to confer with my colleague.

ATTORNEY WOLFF:

Why don't we just go off the record.

VIDEOGRAPHER:

Going off the record at 11:02 a.m.

OFF VIDEO

(WHEREUPON, AN OFF RECORD DISCUSSION WAS HELD)

ON VIDEO

VIDEOGRAPHER:

Back on the record 11:12 a.m.

BY ATTORNEY WOLFF:

Q. Dr. Ducatman, the reason why individuals who have elevated cholesterol are prescribed statins is to reduce the risk of adverse cardiovascular disease.

Correct?

A. Yes.

Q. Are the elevations in cholesterol that have been

seen in PFOA exposed populations clinically significant?
A. Yes.
Q. Has there been a statistically significant increase in adverse cardiovascular events among populations exposed to PFOA?
A. No.
Q. How, if at all, do you describe --- do you --- strike that.
How, if at all, do you explain that discrepancy?
A. First we don't know for sure why there is a discrepancy. So that's the best explanation.
Q. Okay.
A. I'm not done.
Q. Okay. Please continue.
A. In addition, we know that if you have been exposed to this --- this compound, that you are more likely to have higher cholesterol. And in addition, you are more likely to need to take a drug to lower your cholesterol. We have that. We have that data in the literature. So it is clinically significant to people. Now, what we don't know is why that hasn't led also to higher rates of detectable heart disease. I heard three different hypotheses for that. I can even go through them or we can skip over them. And we haven't

found that increased risk.
Q. But I prefer to save that discussion for another day. Thank you.
Is it fair to say that medical monitoring in the form of medical screening is a systematic search for disease in people who have no signs or symptoms of that disease?
A. I've seen that definition and it's clearly wrong.
Q. What's wrong with it?
A. Well, take hearing testing. We do medical monitoring for hearing testing all of the time in people who have signs and symptoms of the disease. Monitoring for hearing loss.
Q. Okay.
So that person has then already a symptom or sign. My question is a little bit different. When you do medical monitoring in the form of medical screening in people who have neither signs nor symptoms of that disease, you are attempting to make a systematic search for disease in that population.
Correct?
A. Leaving aside the word systematic and what it may or may not mean, it's correct. We're looking for --- we're looking for early --- the goal is early detection.

Q. And when you commit asymptomatic plaintiff to medical monitoring, you're making a medical decision and are intervening in their lives medically.

True?

A. So there's couple of assumptions in here that I just need to go over. First we are assuming that the --- you said plaintiffs in this case. But let's talk about the population.

Q. If I did, I misspoke.

A. I thought you said.

Q. I thought I said patients. But okay.

A. I heard plaintiff. I apologize.

Q. If I didn't, I misspoke. I meant asymptomatic patients. Whatever I said.

A. So when we do medical monitoring for a population, some of them are symptomatic and some of them aren't. And we don't distinguish. And we don't say to the people, if you already have symptoms, you're not going to be in our program. I mean, that's just generally not the case. We don't do that.

For the people who are asymptomatic, we don't commit them. Okay. They understand what the program is. We tell them what the program is and they commit themselves because they see a benefit. I am not aware of a program that I have conducted, with the exception

of flu testing, where a person couldn't opt out. Now, also lead testing. People can't opt out of lead testing in some cases. Children. The parents can opt the children out. But there are some jobs where people are required to be lead tested.

But in general people can opt out of testing, even in work places for medical monitoring with certain small exception. Drugs, I just mentioned. Lead in some cases because they really need to be sure that they got the environment right.

Q. In an asymptomatic population, is it fair to say that the vast majority of the people being screened will not have the disease being sought?

ATTORNEY WHITLOCK:

Objection. Calls for speculation.

A. There are many populations in which that's true. And I've also put populations in medical monitoring for which that wasn't true. Where we found the disease actually in everybody we sought it. That was medical monitoring done later than it should have been.

BY ATTORNEY WOLFF:

Q. Is it fair to say that medical screening in an asymptomatic population is often up against staggering odds?

A. Are you asking me a legal question about getting

it?
Q. No, I'm asking a medical question.
A. I don't understand the question.
Q. Okay.
Is it fair so say that screening an asymptomatic population must involve many people to potentially benefit a few?
A. Almost all preventive services are like that and there are exceptions, which we've already discussed. The benefit of the population level is very large. And not all of the people in the population are direct beneficiaries. Except in the sense that they share in the, whatever benefits come to the population as a whole. They may not get them personally, except indirectly because their neighbors, or their family, or their friends have the benefit. That's an indirect benefit.
Q. In assessing the utility of medical monitoring in an asymptomatic population, wouldn't one have to take its risk and benefits into account?
A. Yes. One should take both risks and benefits into account.
Q. Is it fair to say that in a population of 1,000 asymptomatic individuals being screened over a decade in an older population, and even with a common cancer,

only a few, maybe 10 to 12, would be destined to die from the cancer?

A. Well, that question is just --- that question is just not answerable. It's --- it's not a good --- it's not an okay question to answer.

Q. Okay.

Is it fair to say that in assessing a medical monitoring program in an asymptomatic population, the population being screened should be at a significantly higher risk for the undiagnosed disease? That is the disease should have a sufficiently high prevalence in the population?

ATTORNEY WHITLOCK:

Object to the form.

A. You asked two questions there. Should I answer them sequentially.

BY ATTORNEY WOLFF:

Q. Please?

A. Okay.

So we generally don't do this unless there is an increased risk. So that's first. And that's correct. And then you said that there has to be a high prevalence of the disease in the population. And that's not always the case. When we have the ability to intervene early, sometimes we actually use the

screening to let, to show us how good a job we're doing with the condition. You want examples of that or do you want me to leave it at that?

Q. You can leave it at that. Thanks.

Is it fair to say that in assessing a medical monitoring program in an asymptomatic population, one should consider the natural history of the disease and the evidence for an improved clinical outcome as a result of the medical monitoring for the given disease?

A. Yes.

Q. The goal of detecting disease earlier through screening is to improve the outcome when compared to the outcome of the same disease that is identified, because the patient experiences symptoms and goes to the doctor.

Correct?

A. Yes. Or doesn't go to the doctor, even worse. The point is early detection can lead to earlier and better treatment.

Q. And early detection through screening should be known to have an impact on the natural history of the disease process.

Correct?

A. Yes. You should choose diseases in general where you can have an impact. There are some debates about

that. But in general, most experts would say that's the case.

Q. Okay.

And the period of time between when a cancer starts growing and when it causes symptoms is when screening can catch the cancer. True?

A. That's partly true. Sometimes you catch it in symptomatic people who haven't mentioned it to anybody. So you're partly right. And of course, that's --- the goal is to catch it pre-symptomatically. But we also catch it when they're symptomatic and they haven't mentioned it to anybody because they're going through the process.

Q. And aggressive, fast growing cancers are often missed by screening, aren't they?

A. Yes. That can happen.

Q. And when?

A. Often is not the word that I would use. Leaving out the often, it can happen.

Q. And what population based cancer screening tests, if any, have ever been shown to reduce overall mortality?

Q. Cancer screening in reduced mortality? Certainly every once --- about every --- about every decade to two decades some wit, who's usually an epidemiologist,

points out that no one has ever proved that screening reduces cervical cancer. Okay. And, you know, you just read articles like that and you say yeah, okay. Maybe you want your family to not get screened. But believe me, screening for cervical cancer not only reduces disease, but it prevents death. And it does so extremely reliably. We occasionally fail. But the difference in cervical cancer death rates before we started and today are due to screening. And so, you know, you probably don't want me to keep going. But that's an example.

Q. Okay. Cervical cancer. Got it.

As a physician. Do you use subscribe to the proposition that health is not only a physical state of being, but is also a state of mind?

A. Yes. Health is absolutely more than just what we can measure in people.

Q. And do you agree that as a physician you have to be careful not to undermine a person's state of health?

ATTORNEY WHITLOCK:

Object to the form.

A. I'm not sure what you mean exactly. But I'm going to give you a sort of parallel answer. Which is we are trained from the first day of med school above all do no harm. So I think that's what you're getting at.

BY ATTORNEY WOLFF:
Q. It is. Okay. On page six of your report, if you have that in front of you? All right. Let me know. That looks like it could be it.
A. Page six.
Q. Page six. You state that a medical monitoring program for the individuals in Bennington who have been exposed to PFOA through contaminated water should include monitoring for each of these health effects to the degree that useful testing exists.
Correct?
A. Yes.
Q. What do you mean by the qualifier to the degree that useful testing exists?
A. So there's a process you go through for medical monitoring. These are --- these are things that have been established in the literature as increased risks. Then you take that universe of diseases and diagnoses where there are increased risks of disease. And you say which one of these do we have tests for which we can detect the disease early. That's actually not the last step. But it's the next step. And it's what that sentence is about.
Q. Got it.
Would a component of whether a useful test exists

for medical monitoring be the principle that the benefits of the test outweigh its risks?

A. I already mentioned the next step. After a useful test exists. So after a useful text exists. So there is a test. Now, we say to ourselves, okay. This test exists. We're going to think about applying this test in this population. So many people will have positives. So many people will have negatives. We will find some outcome for this test. Is the population substantially better off because we did it? Then as opposed to when you do a test, sometimes you can get a wrong signal. A person can get healthcare. And then the healthcare can --- the upshot of the healthcare is yeah, it's good you came. But you don't have a problem. And that has a cost. Okay. So I thought about all of those things. And you have now jumped to the third kind of thing that you do in what's a multi-step process.

Q. Okay.

Would a component of your multi-step process be an assessment of the specificity and the sensitivity of the test?

A. We'll, yeah. I didn't formally address specificity and sensitivity in some cases. What I thought about instead, sensitivity was looked at. What

I should say is it wasn't the deciding factor in any case. In my mind, specificity was more interesting than sensitivity. If it had low sensitivity, but had good specificity, it wasn't doing harm for example. What you really want to think about is predictive value within the population because you have to think about increased risk. And the thought about increased risk is why every guideline has --- by the way if there's an increase risk, you may do it differently than this guideline. And then some of them go on to say what you will do if there's increased risk, depending on what the nature of the increased risk is.

Q. Okay.

A. So sensitivity and specificity enter into it. Predictive value would be a better concept. And that's still not the final arbiter because whether or not you're doing harm, which is the next next step down, is, you know, is an important consideration. And that doesn't fall seamlessly from just sensitivity, specificity or even predictive value.

Q. Would a component of your multi-step assessment be that the early detection improves the outcome or the natural history of the disease?

A. Yes.

Q. Just in the context of a clinical test, what is

sensitivity?
A. It's the ability to find the problem in people who don't have it. In people --- excuse me. In people who have it. So your --- it's a --- it's a statement about the test. And it's less a statement about how the test applies to the person. As opposed to the predictive value, which is more a statement about if this test is positive, this is how likely it is in this population to be a useful test.
Q. And in the context of a clinical test, what is specificity?
A. So it's kind of --- the opposite may not be technically correct. But it's kind of the opposite. It's the ability to say if you don't have this and we're not going to find it. Okay. So it's about not finding the problem accurately.
Q. In assessing a medical monitoring program in an asymptomatic population, should one consider the sensitivity and specificity of the proposed medical monitoring tests?
A. You do think about it. It just doesn't have to be the final arbiter.
Q. Is it fair to say there may be serious consequences in the use of screening tests with poor sensitivity or poor specificity?

A. Well, okay, so I'm going to divide that into two questions. If the test will detect some cancers --- you used the example of cancer. Much of this isn't about cancer. But you used the example of cancer. If the test will detect some cancers and miss some. So it's sensitivity isn't that good, that's usually not a reason to not do it because you still have improved. Okay. So sensitivity may not be an important arbiter if you can improve things. Provided that the participant understands that we don't even warranty, you know, make a warranty to the product. In other words, we can't promise that healthcare and medical screening is always going to tell you that you're healthy at this moment, even when we've done it. It just doesn't do that. Just like the presence or absence of PFOA. It doesn't tell you you're definitely going to be sick. The presence or absence --- the absence of a negative screening test doesn't say that you can't be sick. Okay.

Q. Is there a second part?

A. Yeah, there's a second part. I'll come to that in a second. I want to finish about sensitivity first.

Q. Okay.

A. Okay. The key there is that you improved things and you're convinced that you can improve things. And

then you go on to the fourth step in the process.
Q. Okay.
A. Imagine yourself sitting down with a primary care doctor in Bennington. And you say okay, here's the program. Here's what we thought. Now, criticize me for what's too much and what's too little. What do you think should be added? And what do you think isn't enough? And you listen carefully because they're the doctors on the ground. Okay. They're the ones who are --- ending up going to have to, you know, implement in some cases, or see in their offices in many cases whatever comes out of the medical screening. And you want them to be comfortable with the process that's going on in their community. You want them to think about it. And they were taught in medical school, just as the rest of us, about sensitivity, and specificity, and predictive value. They may not live with it everyday like some of us do. But they know about it. And they'll have their opinions. And you listen carefully. And that's a fourth step.
Q. And let me ---.
A. Now, onto your second part.
Q. I know that. I know that. I'm just going to ask a quick interjecting question. And we'll get back to it. Have you done that fourth step? Have you spoken

with ---
A. No.
Q. --- practitioners in Bennington?
A. No. All I've done with that is I put everything in my mind. Here's the conversation in my mind. Here's where I think, you know, reasonable doctors will sit down and agree that were doing more good than harm. And I think it would be really good to have that conversation. And in fact, it's actually written in that we should have that consultation into the proposal.
Q. Got it. Now, let's go to the second part, which is the specificity.
A. Okay. So the specificity is, you know, you get a test and you --- I'd rather talk about predictive value. But if you really want to stick with specificity because specificity is not about the test. Okay. I would --- would you be ---?
ATTORNEY WHITLOCK:
Just answer his --- just answer his question.
A. Okay. So the specificity is you get a test. Okay. You do the test. And you want to know how well a negative test reflects a reality. And that's just kind of an inverse way to think about it. The way

clinicians think about it, it's important mathematically. But it's not that great in terms of doing medical surveillance. It's less important to the patients. They want to know about --- they want to know about something completely different, which is called predictive value.

BY ATTORNEY WOLFF:

Q. What is predictive value?

A. Predictive value is we have the test. The test is negative. How likely are you to not have the disease? You have the test. The test is positive. How likely are you to have the disease? And that varies with the amount of disease to be detected in the population. So it's a --- we call that a Bayesian problem, which is informed by the amount of disease that's there in the population.

Q. What is a false positive?

A. A false positive is a positive test in a patient who doesn't have the disease.

Q. Is a false positive a false alarm?

A. It's possible to use that word. I don't think it's very informative because doctors don't do things that alert and alarm their patients when they just get a false positive. They say we need to follow-up on this and get more information. They don't send out a

whole group of other doctors who are going to begin to treat it on a specialty basis on the basis of one test. I don't think the analogy is that good. You could use it if you want. But as a doctor, I don't like it. I don't think it's a good comparison.

Q. What is a false negative?

A. A false negative is when you get a negative test when the disease is present.

Q. What is over diagnosis?

A. Over diagnosis is when we diagnose disease where it doesn't exist. And the implication is we do it routinely.

Q. Is it fair to say that in the context of cancer, over diagnosis is the detection of a cancer that is not destined to ever cause symptoms or death?

A. Okay. You're talking about a different concept. And you're talking about --- it's this is a really prominent literature. It's most prominent in prostate cancer. And in prostate cancer, they use the word overdiagnoses. So now, I know why you're using that word. You used it a different way then I did.

Okay. Over diagnosis as you mean it is just what you said. The early detection of the disease for diseases that do not necessarily lead to disability or death. And if you do that, the over diagnosis argument

is that since you detected that disease early, you actually on average in a population, do patients more harm than good. And that's the over diagnosis argument. And it relates mostly to prostate cancer. But there's also a type of thyroid cancer for which it's also very clearly at issue. And if we sat here and thought about it, I can probably come up with some others too.

Q. Over diagnosis is also an issue with breast cancer, is it not?

A. So with breast cancer, that kind of over diagnosis is an issue. As it gets better and better, it's very clear that early detection is really a great idea. So over diagnosis is a discussion. But now we're using it the way I used it initially. And not the way you used it. Okay. There are no arguments out there that we shouldn't try to find breast cancer as early as possible. The only discussion is at what age do you start.

Q. Is it fair to say that over diagnosis is the identification of slow-growing cancers that even if untreated, would never cause symptoms or reduce survival, because the screening test cannot distinguish between the abnormal appearing cells that would become cancerous from those that would never do so?

A. For cancer, that's a good description. The other issue is whether they're actually neoplastic to begin --- if they're neoplastic --- they are neoplastic by definition, whether they're actually cancer. Okay. So that's another subset of that discussion.

Q. A false positive test effectively means that you are sending a healthy patient to a doctor for some type of follow-up.

Correct?

A. Well, you sometimes don't send them depending on what you think the signal is and who you think the patient is. But if you do send the patient, then you're correct.

Q. And a false negative test effectively means that you are clearing a patient who should be referred to a doctor for some type of follow-up.

Correct?

A. In the context of what we're talking about. And actually, it doesn't specifically mean what you said. But in the context of what you're talking about in medical monitoring, that is what it means.

Q. What are the harms related to a false positive test result?

A. Well, the common harm is the patient has an additional evaluation. The less common harm, but it's

not impossible, is that evaluation becomes invasive. And the patient has harms of invasive diagnosis. And then still less common, but can happen is the patient actually gets an important intervention for a disease they don't have. And implicit in all of this is cost.

Q. Have you ever heard of the concept of labeling?

A. You're talking about labeling patients?

A. Yes.

Q. So giving them a label that makes them feel self-conscious is what you're getting at?

A. Yes.

Q. Is that a harm related to a false positive test?

A. Well, it can be in some patients. Most patients are pretty resilient to that. You do have to be, you know, this is actually me. I'm in the clinic. I'm with a patient. You see, you size up the patient. It's a fellow physician, you know. We have a very frank conversation. It's somebody who I take to be more fragile and so forth, I say look here's what we found. Here's what we need to do. There's no reason to worry now, you know. So you either --- you take what you know about the patient when you find a problem. But that doesn't mean that you back off from finding the problem. Patients are there to see you because they want you to do your job.

Q. What harms are related to a false negative test result?
A. There are fewer harms, but they still exist. It's the patient can think that they have been cleared for a disease that they actually have. And that can be harmful. You know, a well designed program won't in general create that perception. However with an individual patient, perceptions are hard to predict.
Q. What harms are related to over diagnosis?
A. Over diagnosis can lead to --- you used it both ways. But I think you have now mean it in terms of a disease where you're detecting both really important and indolent cancers together. And you're talking now about the indolent cancers that would not necessarily affect the patient in their lifetime.
Q. Correct. That's what I'm talking about.
A. Thank you. In that circumstance the harm is, and this actually happened in one nation very routinely and in the U.S. to some degree, for example, for thyroid cancer. The harm is that people get a surgery they don't need. And then they need healthcare and follow-up to that surgery because the surgery may, for example, take out the thyroid.
Q. Can we go off for just a minute?
VIDEOGRAPHER:

Going off the record at is 11:44 a.m.
OFF VIDEO

(WHEREUPON, A SHORT BREAK WAS TAKEN.)

ON VIDEO
VIDEOGRAPHER:
Back on the record is 11:51 a.m.
BY ATTORNEY WOLFF:
Q. Is it fair to say that false positive results can result in follow-up testing that is uncomfortable, expensive, and potentially harmful?
A. That can happen. All of that can happen.
Q. Is it fair to say that persons with false negative results may have delays in diagnosis and treatment?
A. I don't know the answer to that. I don't think we know that a false negative. Again, you're asking a question in the context of medical surveillance. So it's certainly true outside of the context of medical surveillance. Because if you miss it and it's your patient, then you do have a delay and it's a problem. If medical surveillance also misses it, and you're already at zero, you know. And have you added to the problem? I don't know the answer to that. So the former is certainly the case. The latter is kind of

philosophical question.
Q. Is it fair to say that although screening may prevent the development of disease related morbidity and mortality, positive test results, both false positive and true positive, may lead to interventions that could be unnecessary or even risky because of over diagnosis and over treatment?
A. Without getting into the definitions, I think the general answer is yes. All of that is possible. Medicine is imperfect.
Q. Is it fair to say that the normal ranges for biochemical tests are often based on the 95 percent confidence intervals in a normal healthy population? That is although everyone is healthy by convention, the values outside the 2.5 percent lower, and 2.5 percent upper extremes are considered to be abnormal?
A. They're reported by the lab as abnormal when they have been derived that way. Not all tests are derived that way. There are some for which abnormals are actually not about the 95th percentile. For the ones where it is the 95th percentile, the abnormals are reported that way, and they're reported as abnormals. As labs, they don't say that you have this disease. They're reported as lab abnormals. Does that answer your question?

Q. It does. Thank you.

Is it fair to say that ordering six blood tests in a normal healthy individual yields only a 74 percent chance that all six tests will be normal? That is there's a 26 percent chance that one or more may be abnormal?

A. Well, I have to sit down and do the regression. My guess is that you're approximately right because without doing the regression, that sounds in the ballpark.

Q. And when ordering 12 tests in a normal person, there is a 54 percent chance that all 12 will be normal. And a 46 percent chance that one or more will be abnormal.

Correct?

A. Your general point is correct. As to the percents, you know, I'm not running the math through my head right now.

Q. Fair point.

A. Probably nobody in this room could.

Q. Is it fair to say that simply ordering tests in healthy individuals or in the absence of clinical suspicion of disease may result in many false positive test results that can lead to false alarms, anxiety, additional testing, and possible morbidity, or

mortality from subsequent testing or interventions?

ATTORNEY WHITLOCK:

Object to the form.

A. The word many sound editorial. Take out the many and all of that is potentially true.

BY ATTORNEY WOLFF:

Q. You are no doubt familiar with the U.S. Preventative Services Task Force.

Correct?

A. I am familiar with it.

Q. The U.S. Preventive Services Task Force was established by a congressional mandate. And is comprised of an independent volunteer panel of 16 national experts in prevention and evidence-based medicine.

True?

A. I didn't know the number. If you say it's 16, then I accept it.

Q. And one of your former colleagues on the faculty at West Virginia University School of Public Health, Dr. Gilbert Ramirez recently served as a member of the Task Force.

A. I didn't know that.

Q. You didn't know that? Okay.

Is it fair to say that the task force is generally

considered to be a reputable and reliable part of the medical community?
A. Yes.
Q. Have you ever applied to be a member of the task force?
A. No. And did you say medical community?
Q. Yes.
A. Okay. So just a couple of points of clarification. One is that I think it's preventive and not preventative.
Q. Yes, preventive. Yes.
A. And the other is --- the other is that I don't think Dr. Ramirez is a physician.
Q. Dr. Ducatman, Exhibit 11 is an excerpt from the U.S. Preventive Services Task Force procedure manual. And if you would please turn with me to page 43, which is the last page in this excerpt. And the second paragraph, which is section 6.6.2 under the heading of general types of harm for consideration. Do you see that?

(Whereupon, Exhibit 11, Excerpt from U.S. Preventive Services Task Force Procedure Manual, was marked for identification.)

A. I do.
BY ATTORNEY WOLFF:
Q. Do agree with the proposition that harms of screening may include psychological harm from labeling, the harms of diagnostic studies to confirm the presence of the conditions, and over diagnosis of screen detected conditions?
A. That's the second paragraph, yes.
Q. Was your answer yes?
A. Yes.
Q. Do you agree with the proposition that because screening and other preventive interventions are implemented in asymptomatic persons with the goal of preventing future disease, one should place a high priority on considering the harms of over diagnosis and over treatment. Whereby the preventive service has the unintended consequence of creating disease that often leads to unnecessary and ineffective treatment?
A. I agree there's a caveat. And that is that we're talking here about when the screening is done and those are asymptomatic. And screening is done in both asymptomatic and symptomatic people.
Q. Do agree with the ---?
A. Excuse me. Monitoring. I apologize. Monitoring is done in both asymptomatic and symptomatic people.

Q. And this concept applies to an asymptomatic individual?
A. You know, it could also apply to a symptomatic individual as well. Just maybe less likely to. But this is only about the asymptomatic. And that specifies it.
Q. Do agree with the proposition that harms of early treatment and over diagnosis may a include a patient whose condition might never have come to clinical attention, or for whom the harms of treatment initiated prior to routine clinical detection were different, or occurred earlier, or over a longer period of time? In other words, these are harms of treatment that would not have occurred in the absence of screening. Do you agree with that proposition?
A. Yes. The last one is kind of ambiguous because they're saying it's necessarily --- it can be read. They may not be saying it. But it can be read to say no longer treatment is necessarily bad. And of course, when treatment is helping, you want it over a longer period of time. It means you're living. But yes, I agree with all of those things provided we understand what it says.
Q. Please turn with me to page 42. Section 6.6.1 on the preceding page. Are you there?

A. Yes.
Q. And do agree with the conceptual notion that screening is intended for asymptomatic individuals in order to prevent or delay future health problems?
A. I'm going to answer that question in two different ways. First, the answer is yes. And secondly, that's not all they're intended to do.
Q. Do agree with the proposition that the burden of proof that the benefits exceed the harms prior to recommending implementation of screening for other preventive services is thus higher than it is for diagnosis or treatment of symptomatic conditions?
A. That's their current stance. There are people who disagree with it. And I'm kind of neutral about that. I go to meetings about this. And people argue about whether we have --- so I go to quality assurance --- quality improvement meetings. It's one of my clinical tasks. And people argue about whether the pendulum has swung much too far so that we've placed a much too high of a value on over diagnosis. And as a result, we are missing diagnoses and hurting people that way.
Now, this sentence doesn't necessarily, you know, tell you were you need to fit in that --- in that continuum of yes, we should do it. No, we shouldn't do it because we're thinking about the competing harms and

benefits. However, it only addresses one side of it. And people worry about that. And they worry about that a lot at meetings. And they're very critical of the U.S. --- this Task Force.

Q. USPSTF.

A. Thank you. I appreciate that. I'm impressed that you can do that because I mess it up every time I try. They're critical of the USP --- this task force because of that focus on just one side of it. And I hear that continuously at meetings. I'm kind of neutral about it. Both things are important. And I don't know that they're a competition, except insofar as we're just trying to do the best we can.

Q. Okay. We're done with this document for the time being.

A. Thank you.

Q. Is one of the fundamental precepts of preventive testing that one should avoid doing more harm than benefit?

A. Yes.

Q. Doesn't screening all comers in an asymptomatic population mean that you increase the number of false positives, each of which comes with an obligation to follow-up?

A. Not all positives come with an obligation to

follow-up. That's a decision. However, that danger, then yeah. That danger is there. And again, you have discussed only an asymptomatic population. And we screen asymptomatic and symptomatic populations.

ATTORNEY WOLFF:

Exhibit 12 is an excerpt from the U.S. PSTF Guide to Clinical Preventive Services.

(Whereupon, Exhibit 12, Excerpt, was marked for identification.)

BY ATTORNEY WOLFF:

Q. And if you would please turn with me to the preface on page Roman VI immediately under the bullet points.

Do agree with the proposition that clinical decisions about patients involved more complex considerations than the evidence alone, clinicians should always understand the evidence, but individualize decision making to the specific patient and situation. Do agree with that?

A. Yes.

Q. Do agree with the proposition that recommendations for preventive services should be tailored to individual patients?

A. I don't know what you mean. And the reason that I don't know what you mean is in general, where we make up --- where we do preventive services, we're generally doing it for populations. We try very hard to think about individuals within those populations. But the services are generally tailored to a population.
Q. Do you agree with the proposition that preventive testing should be tailored to meet a specific risk?
A. We like to tailor it to risks. I'm not sure I know what you mean by specific. But I think it's okay if you want to say specific. And then if you mean something different than what I think you mean, we'll talk about it later.
Q. Would you agree that if a false positive test result leads to further testing, each of the follow-up tests carries risks of false positive and false negative test results?
A. All tests regardless of their origin carry those risks. So you don't even have to stipulate with an introductory phrase. Any test can have a false positive. Any test can have a false negative.
Q. Because cancer screening is typically a repetitive process at regular intervals, such as an annual screening, false positive test results will accumulate over time.

Correct?
A. I'm not sure I know what you mean by accumulate. But there will be more. The longer you do it, the more you'll have. I mean, we don't keep them in a box somewhere. And, you know, the weight of the box gets bigger. But there will be more of them. I think that's what you mean.
Q. Are you familiar with the rate of false positive results in screening mammography?
A. The rate keeps changing depending on the technique. And I don't think there's a single rate. There are false positives. And the balance against that is the remarkable improvement in breast cancer survival that has occurred over the past 20 years. So yes, there's false positive. And yes, so far the battle is worth engaging. And it looks like the longer we do it, the better we get at it.
Q. Are you familiar with the data demonstrating the long term psycho-social consequences of false positive screening mammography?
A. Data and false positive? I haven't read that specific literature. I've read about false positive and emotional issues. And whether I read it specifically about breast cancer or other diseases is not something I remember. And I do not recall breast

cancer specifically.
Q. Is it fair to say that the harms of cancer screening are more certain than the benefits?
A. I don't think there's many people who would agree with that at all.
Q. In cancer screening in an asymptomatic population as compared with avoiding a cancer death, false alarms or false positives are much more common.
True?
A. Could you repeat that question? I just couldn't follow it.
Q. Sure. In cancer screening in an asymptomatic population, as compared with avoiding a cancer death, false alarms or false positives are much more common.
True?
A. Cancer screening has false positives. I can't say it's always the case if there's more than the true positives. It may be cancer specific. In general, I think there's a risk. That statement is generally true for many cancers.
Q. Earlier today, we briefly discussed that over diagnosis is a concept most widely understood in prostate cancer screening.
Correct?
A. Prostate or thyroid. I would say those two. And

I think the general population is more aware of it in prostate than it is in thyroid. But I'm pretty sure doctors are aware of it in both.

Q. And over diagnosis is also recognized as a problem associated with early detection of other cancers, such as melanoma, kidney cancer, breast cancer, and lung cancer.

Correct?

A. Well, it is. But for some of them, the real problem is under diagnosis. And nobody's terribly, you know. There are people who are focused on over diagnosis because it's a problem and an issue. But the real problem is we don't --- we're not really good at finding it for some of them.

Q. All cancers have some harm, don't they? I'm sorry. Strike that.

All cancer treatments have some harm, don't they?

A. I can't think of exceptions. There may be some, but they don't come to mind.

Q. And unnecessary cancer diagnosis is an obvious harm, isn't it?

ATTORNEY WHITLOCK:

Object to the form.

A. Any misdiagnosis is a harm. When you say unnecessary, I don't know if you mean misdiagnosis.

BY ATTORNEY WOLFF:
Q. Over diagnosed cancers are typically treated because doctors often cannot tell which ones they are in an individual case.
True?
A. That can happen. They often are. They aren't always. And that's why I didn't like your last --- this is much better phrasing.
Q. The treatment of an over diagnosed cancer is treatment that cannot help that patient because there is nothing to fix in that patient.
True?
A. So there's two issues there.
Q. Okay.
A. Let's go over them. The first is if you can know --- and you already alluded to this. The first is knowing in advance. We know in advance that this one is not going to grow. Well, darn it. We're not going to treat. Or we know in advance that okay, this one may grow a little. But this patient is 80. And we know that its growth rate is such that this patient is much more likely to get sick from something else first, that's much more important. We're not going to treat it. The key is knowing. The key isn't that that's an issue. The key is knowing. And it's hard. And that's

what you're getting at.
Q. Would you agree that the treatment of an overdiagnosed cancer is a treatment that can only lead to harm?
A. If we accept that it's over diagnosed. If we accept that we know it. So I mean, since you defined it that way, yes. The problem is knowing which ones to define that way.
Q. You do not use the terms sensitivity, specificity, false positive, false negative, over diagnosis, or prevalence in the text of your report, do you?
A. I don't recall using any of them.
Q. Why not?
A. I didn't think that it helped with anything regarding the outcome that I came to at the end of the report. At the end of the second report.
ATTORNEY WOLFF:
Let's go off the record.
VIDEOGRAPHER:
Going off the record 12:13 p.m.
OFF VIDEO

(WHEREUPON, A SHORT BREAK WAS TAKEN)

ON VIDEO

VIDEOGRAPHER:
Back on the record 12:52 p.m.
BY ATTORNEY WOLFF:
Q. On page nine of your report, at the end of the second paragraph, you state that the earlier these health conditions are detected, the more effectively they can be treated. My question is this. Is that statement true for each and every of the end points that you list on pages five and six of your report?
A. I have to think about that. I can't assert that it's true for each and every one of them.
Q. Can medical monitoring through the clinical laboratory tests that you list on pages seven and eight of your report improve the shorter duration of breast feeding?
A. That's possible, but we don't know that. It can.
Q. Can medical monitoring through the clinical laboratory tests you list on pages seven and eight of your report, improve the outcome of developmental abnormalities, including lower birth weights and more markedly effective subsequent adiposity when compared to the outcome of such developmental abnormalities that are identified because the patient experienced symptoms and goes to the doctor?
A. You know, it could. But that might not mean that

it's a great idea. Okay. And if you want me to discuss that further, I can. That's up to you.
Q. So when you say that it could, but that it might not be a great idea, what in general do you mean?
A. With time. As time passes, the amount of contamination within people is going to decrease. So that's a good thing. On the other hand, there is a window of health for giving birth and also for other things related to human development that, you know, you don't want to be too young. You don't want to be too old. And so I mean, it's not that you can't be. It's that ideally, and if you had your choice, you would have --- you know, if everything else were equal you would have a child at an age of maximum health. And delay might or might not and most often would not play into that. And so the answer is it could help. But it might not help. And you have to think about it both ways very carefully.
Q. How could the clinical laboratory tests that you list on pages seven and eight of your report improve the shorter duration of breast feeding?
A. I think I just answered that. Do you want me to expand on that? I should expand. It's clear I didn't --- I didn't get it all the way through. So if you --- the shorter duration of breastfeeding, if it's

causally linked, okay. And there's increasing evidence that it looks like it may well be. And there's also animal evidence that the breast is altered. And then there's also a discussion about whether it's causally linked through psychological means. But whether it's psychological, or physical, or both, there is this link. And if women choose to delay, and their perfuoroalkyl substances go down, they may have, if they improve and we don't know that they will. They might have better duration of breastfeeding, longer duration of breastfeeding. However, we don't know that. And balanced against --- you asked if it could.

Q. Right.

A. If it could.

Q. And I guess the part I'm struggling with is you have a list of clinical laboratory tests running from albumin, right down through I think uric acid. And so what I'm just trying to figure out is how do any of those particular tests improve the ---?

A. I'm attempting to answer.

Q. Yeah.

A. So so now it's a mom. And she says to herself I want to delay my pregnancy because. Now, I'm not saying that's a good idea.

Q. Because of what?

A. Because of perfluoroalkyl substances would be lower later.
Q. What does that have to --- got to do with the level of albumin or BUN?
A. You didn't ask me albumin or BUN. You asked me about breastfeeding.
Q. Right. My question was how can these tests ---?
A. If you want me to go through them one at a time, I can. But you asked me about breastfeeding. I was answering your question about breastfeeding, not about albumin.
Q. So I think we may be having a disconnect. So my question is, and you've got, you know, a series of blood tests that you recommend. How do those series of blood tests improve the shorter duration of breastfeeding, if at all?
A. Well, you're confusing me because the end of the second report, of course, we don't --- we don't do anything other than ask questions about that. However ---.
Q. Okay.
A. However, I will reiterate so that it's clear. I'm not asserting it's a good idea. But it is the case that it is possible that woman may delay. I get calls all of time about things like this in my office. They

may delay their pregnancy and that might improve the duration of their breastfeeding. I will tell you also, I don't recommend that course of action. And that's because if something that you also mentioned, which is competing risks. Okay. So I don't recommend that people delay pregnancy because of concentrations that are in people's blood, or because of their fear that they may have it, but they haven't been granted testing.

Q. But what that really kind of keys off of is that there is a sort of half-life of PFOA in the blood. And that the blood levels decrease with time, as opposed to being a function of the results of testing for albumin, or BUN, or creatinine, or any of the others?

A. And you're testing for PFOA in that case. In each one, you asked a question that was pertinent to the testing of PFOA. And not a question that was pertinent to the testing of anything else. If you want to ask a question about anything else, I'll do my best to answer.

Q. Oh, I see. So your question is in terms of what the serum levels of PFOA are detected in the blood?

A. Well, your question was about breastfeeding. And so the answer to have becomes about the PFOA serum concentration.

Q. Okay. All right. That's where the disconnect was. I now understand. Thank you.

Can medical monitoring through the clinical laboratory tests you list on pages seven and eight of your report improve the outcome of kidney cancer when compared to the outcome of kidney cancer that is identified because the patient experiences symptoms and goes to the doctor?

A. Kidney cancer is a really tough disease. Anything we can do that will speed up the diagnoses gives a patient a much better fighting chance. In addition, we're really bad at finding it. Really, really bad. If you can detect it through a means that isn't imaging, then you have a --- then you have a good, low risk approach to thinking about whether or not you want to look at it. And plus the urinalysis also addresses another of the diseases that we're concerned with, which has to do hyperuricemia.

Q. Do any of the --- are any of the blood tests that you list on pages seven and eight of your report diagnostic of kidney cancer?

A. None of them. There is no diagnostic test for kidney cancer. There's nothing that lights up and says you have kidney cancer. And frankly, for most cancers, there's nothing that's absolute even for a really bad

looking mammography on breast cancer. That's very, very high risk. It isn't always breast cancer. But when you get hematuria and you start to think about whether or not there's additional need for evaluation, that's a reasonable thing to do. And it's something that it would be a very reasonable discussion of the doctors in Bennington.

Q. Can medical monitoring through the clinical laboratory tests that you list on pages seven and eight of your report improve the outcome of testicular cancer, when compared to the outcome of testicular cancer that is identified because the patient experiences symptoms and goes to the doctor?

A. It can improve the outcome in this sense. You may have to do less to treat it. The outcome of testicular for a patient who goes to a, you know, a really good hospital is so good already. We do so well these days with testicular cancer that if the outcome is only mortality, then I don't know that we improve the outcome. On the other hand, if the outcome is how much we have to treat to get to that outcome, then we can.

Q. Can medical monitoring through the clinical laboratory tests you list on pages seven and eight of your report improve the outcome of gout, when compared to the outcome of gout that is identified because the

patient experiences symptoms and goes to the doctor?
A. Yes. The problem with gout is not only what people think of as gout alone. It's the effects of gout on the kidney. Earlier detection allows doctors to think about whether or not they need to be protecting the kidney.

There's also the prevention aspects of gout. You don't want --- gouty attacks. That's --- that's also there. But the kidney is the one where we actually related to morbidity and mortality in a more direct way.

Q. Let's --- I'll freely confess this may be a little bit tedious. But I think it's just an exercise we need to go through. And that is addressing sort of in order, the tests that you list on pages seven and eight of your report. Okay?

A. Okay.

Q. May I mention one thing about that? Some of things that you talked about, you know, what we're doing isn't per se a test. Okay. For example, for --- for pregnancy induced hypertension, for example, where we have an outcome, we're talking about your blood pressure monitoring. It's not a lab test. Some cases what we're doing is recording something on a survey and not ordering a lab test.

Q. Is it fair to say that taking a blood sample with a needle carries risks that include bleeding, infection, bruising, dizziness, and soreness?
A. Yes.
Q. Albumin, if this test is positive, or in other words abnormal, what specific disease, if any, is this test for?
A. The reason I listed albumin there was first because it's associated. And secondly because of its association, which is actually non-causal. It makes it easier to think about the perfluoroalkyl substance levels. It's actually in the adjustment category that people are concerned. It helps you think about if there's some other reason. Some other contributing reasons.
Q. So is there are any specific disease that the albumin test is for?
A. There are. There are, but not in this. And we didn't make it as a final recommendation. I didn't think there was of benefit.
Q. So albumin dropped out in your merits report?
A. That's correct.
Q. Okay.
Alkaline phosphatase, if this test is positive, what specific disease, if any, is this test for?

A. It's not specific. But you find it elevated in several diseases, including biliary tract disease. And we've --- I don't recall, but I don't think we included it in the final list.
Q. Do you want to check that?
A. We can check it. It's not included.
Q. Why did you not include it in the merits report, but did include it in the class certification report?
A. When I got to that last step, I was talking with the doctors and Bennington in my mind. It wasn't that it would do harm. It's that they would have patients in their office with a question that wasn't directly related to the major issues of concern. It was more peripheral. And I thought they want to focus on the major things. It wasn't a question of harm. It was more a question of not enough benefits.
Q. Alanine aminotransferase, if this test is positive, what specific disease, if any, is this test for?
A. It's primarily for liver disease. There are other things that can affect it a little bit. But it's a --- it's called a liver enzyme.
Q. Is there any particular liver disease that it's diagnostic of?
A. No, it's non specific. People use ratios between

it and other diseases in other, excuse me, it and other bio-markers, in order to think about which diseases are likely the ones present.

Q. What is the sensitivity and specificity of the alanine aminotransferase test for diagnosing liver disease?

A. The literature says it's actually pretty good and specific. It's not perfect. It's not as sensitive as you would like. And all that literature, and we discussed that a little bit this morning, is based on just as you framed it, 95 percent of the population rather than the actual liver physiology. As we have gone into the epidemic that we're having now of fatty liver disease, or steatosis, or the spectrum of non-alcoholic fatty liver disease. People have rethought that approach. And they're now starting to use a much lower cut off to figure out who needs to get follow-up testing for fatty liver disease. And it's very beneficial to know that at an earlier time.

Q. So they're using a lower cut-off on the alanine aminotransferase?

A. ALT.

Q. ALT.

What is the predictive value of the ALT test for diagnosing liver disease?

A. So that --- I know that sounds to you like a great question, but it's not the test alone. What they're doing is they're using a test in combination with other things and they're using markers. However, there is this very interesting paper that just came out. That people with an ALT above, I want to say 23. And if it's 25 or 26, I apologize, are that something like when they went and evaluated these people, something like 68 percent of them had the beginnings of fatty liver disease. Which is actually pretty impressive as a screening test if that stands up under a bigger population.

Q. Is it fair to say that blood testing for ALT levels is among the care that would be provided to someone who sees a doctor regularly?

A. No.

Q. ALT levels are routinely checked as part of the periodic physical exam.

Isn't that correct?

A. Well, it's no actually not. If you order an ALT and you have an insurer involved, you kind of need to say why you have done it. You have to have a reason.

Q. Would you find it unusual if several of the Plaintiffs in this matter have had their ALT levels routinely checked as part of a periodic physical exam?

A. No. There's some doctors who do that. But it's not a current recommendation of anybody that I know about. Now, you could see that change because of the fatty liver disease question. And I would be an advocate for that change based on literature I've seen so far, if it pans out.

Q. Were you aware of the fact that several of the Plaintiffs in this matter have had their ALT levels routinely checked as part of the periodic physical exam?

A. No. I think I already answered no, I am not aware.

Q. Bilirubin direct in total. If this test is positive, what specific disease, if any, is this test for?

A. These are actually --- this is sort of like the last question. These two things are different. And epidemiologists always want to consider them together. And then clinicians say no, they're no good together. One of them has a different indication than the other. So the direct bilirubin relates to the --- direct and indirect versus conjugated and unconjugated. Come on, Alan. Memory.

Now, I apologize. I'm having another memory lapse right now of something that I've known for many, many

years. But one of them is about the liver. And the other one is about the blood. And I'm pretty sure that direct and conjugated are about the liver. But I know I'm not even pretty sure. That's my memory at this moment. But boy, I'm feeling a lot of uncertainty.

Q. So what --- just liver disease ---?

A. And blood disease. You want to know the difference?

Q. No. No. Liver disease sort of categorically, and blood disease categorically? Or any particular type of liver diseases or blood diseases?

A. Well, bilirubin will go up eventually in all liver diseases eventually. There's some that goes up even more. But when you look at a bilirubin, you need to know both because a total bilirubin can confuse you because you don't know which it is.

Q. So what is the sensitivity and specificity of the bilirubin test for diagnosing liver disease?

A. There is a --- it is not very sensitive. It doesn't move much until much later. It is specific. But there's one really notable exception. I'm looking for the word exception. And that exception is a pretty common condition, which is called Gilbert syndrome. Which is generally not dangerous. But which captures clinicians' attention, they're going to have to think

about it. Because the bilirubin is elevated in that. And those patients are pretty often healthy. And there's some literature. And in some ways they're healthier. However, there also extreme cases of Gilbert Syndrome which Gilbert itself to create a problem. So it's like everything else. It's a continuum. G-I-L-B-E-R-T. And is there an apostrophe before the S? That convention has changed. There used to be. But I'm not sure there still is. And it may not be Gilbert.

Q. So what is the predictive value of the bilirubin test for liver disease?

A. The predictive value. So if you get an elevated bilirubin and it's the right one, there's something wrong with that patient's biliary tree or liver. And it doesn't have Gilbert Syndrome or some other similar, very rare genetic abnormality. Gilbert is the common one.

Q. And if the bilirubin test is positive, what is the sensitivity and specificity for diagnosing blood disease?

A. Okay. So we've now flipped over to blood disease. You're looking at specificity and sensitivity in a population. Well, if it's elevated enough, you can say that they've got some hematologic problem pretty

quickly. But which one may require working with additional, almost certainly will require additional evaluation. Not real common, but we do find it.
Q. And what is the predictive value of the bilirubin test for diagnosing blood disease?
A. Disease isn't always the right word. Sometimes it's syndrome in people who aren't necessarily all that sick. But disease is more common. And you get numbers who prefer to say hematologic problems, so that we understand it's not cancer, with elevated bilirubins. It's pretty good for that when it gets high enough.
Q. Is it fair to say that blood testing for bilirubin levels is among the care that would be provided to someone who sees a doctor regularly?
A. No.
Q. Bilirubin levels are routinely checked as part of a periodic physical exam, aren't they?
A. Not that I'm aware of. I don't think that that's usually the case. There may be doctors who do it because there's lots to be gained from it, but if you look at those recommendations --- for example, you know, whole population recommendations I don't think you're going to see a bilirubin.
Q. Would you find it unusual if several of the Plaintiffs in this matter have had their bilirubin

levels routinely checked as part of a periodic physical exam?
A. No.
Q. Were you aware of the fact that several of the Plaintiffs in this matter have, in fact, had their bilirubin levels routinely checked as part of the periodic physical exam?
A. No.
Q. Blood urea nitrogen or BUN, if this test is positive what specific disease, if any, is this test for?
A. In combination with creatinine. That helps you to look at liver functions.
Q. Should we talk about both BUN and creatinine together then?
A. We should.
Q. Okay.
A. However, you're probably aware that only one of them is in the final recommendation.
Q. Which one is not in the final recommendation?
A. BUN.
Q. Why is BUN not in the final recommendation?
A. I didn't think the determination --- again, imagine myself sitting with Vermont doctors and they said, you know, if you send us --- if you send a

patient with elevated creatinine to the office we're going to do a BUN. Take an extra step to figure it out. Wouldn't be --- wouldn't be necessarily be needed up front.

Q. If the test for creatinine is positive what specific disease, if any, is this test for?

A. Positive is the interesting word, but skipping past that it's --- it's for kidney disease.

Q. What is the sensitivity and specificity of this test for diagnosing kidney disease?

A. As the creatinine goes up it's pretty good for diagnosing kidney disease. Is it sensitive enough? It is in one sense when we see abnormality it's --- it's --- it's sensitive. The problem is it doesn't move as fast as you would like and so you have to really be thinking about it. May I give you --- should I give you an example of what I mean by that? It's up to you.

Q. Yes.

A. Okay. So we're monitoring maybe a group of workers who have cadmium exposure, it's not in this community exposure, it's a group of workers. And cadmium exposure is notorious for causing kidney disease and we're checking creatinine and the creatinine may or may not move. But if they do move the problem is kidney disease has already happened.

We're not happy then. We would love a test that was before that. Okay? So it's a good test, but it's not super early. It's once it starts moving it's --- it's a problem.

Q. Okay. So then what's the predictive value of the creatinine test for diagnosing kidney disease?

A. When you get a positive test it's unfortunately not too good.

Q. Is it fair to say that blood testing for creatinine levels is among the care that would be provided to someone who sees a doctor regularly?

A. We don't normally order that unless there's a reason. Some doctors, as you have pointed out, will do that, but it may not be part of a routine recommendation for a patient who doesn't have any signs or symptoms of anything.

Q. Would you find it unusual if several of the Plaintiffs in this matter have had their creatinine levels routinely checked ---

A. No.

Q. --- as part of the ---?

A. It's a good test and doctors check it sometimes, you know, insurance company approval permitted.

Q. Were you aware that several of the Plaintiffs in this matter have had their creatinine levels routinely

checked as part of the periodic physical exam?
A. No. May I add one thing that I neglected to add earlier about creatinine?
Q. Sure.
A. So it has another use related to the perfluoroalkyl substances besides the diagnosis of disease. This is like albumin but I decided it was important enough to keep it in as well. It's not the only reason. It's one of the reasons. In kidney failure we actually may be clearing less of these things, so it's important to know that as well. So creatinine is a nice marker of kidney failure and the anticipation that your PFAS is going to go down, maybe mitigated if you have kidney failure because it's one of the routes of excretion.
Q. Okay.
Cholesterol testing whether total LDL, HDL if this test is positive what specific disease, if any, is this test for?
A. Well, high cholesterol is ICD now 10 codeable diagnosis and the risk factors are for vascular disease, so that's heart disease, and stroke and other vascular disease which by the way could include kidney disease down the line.
Q. Is it fair to say that blood testing for

cholesterol levels is among the care that would be provided to someone who sees a doctor regularly?
A. It would depend on their age.
Q. Cholesterol levels are routinely checked as part of a periodic physical exam in individuals once they start getting into their 20s and --- and older?
A. You know, I don't think there's necessarily a recommendation at 20. There may be doctors who do that. We would have to go down and sit down with test for recommendations for when you do that in a asymptomatic individual, but I don't think that it's 20.
Q. Cholesterol levels are frequently checked in lipid panels along with triglycerides.
Correct?
A. Yes, that's correct.
VIDEOGRAPHER:
Counsel, can I go off the record to change the video?
ATTORNEY WOLFF:
Go ahead.
VIDEOGRAPHER:
Going off the record at 1:21 p.m.
OFF VIDEO

(WHEREUPON, A PAUSE IN THE RECORD WAS HELD.)

ON VIDEO

VIDEOGRAPHER:

Back on the record at 1:22 p.m.

BY ATTORNEY WOLFF:

Q. Exhibit 13 is an excerpt from the USPSTF Clinical Guide to preventative services from 2014.

(Whereupon, Exhibit 13, Preventive Services Excerpt, was marked for identification.)

BY ATTORNEY WOLFF:

Q. And if you take a look at page 45 the --- and then it also continues I think with greater depth at pages 97 and 99. The USPSTF recommends as a priority testing blood serum level for total cholesterol, LDL and HDL in men age 35 years and older, men ages 20 to 35 years who are increased risk for coronary heart disease and women ages 20 and older who are at increased risk for coronary heart disease.

Correct?

A. Yes, that's what it says.

Q. And would you find it unusual if several of the

Plaintiffs in this matter have had their cholesterol levels routinely checked as part of a periodic physical exam?
A. No.
Q. Were you aware that several Plaintiffs in this matter have, in fact, had their cholesterol levels routinely checked as part of a periodic physical exam?
A. No.
Q. C reactive protein, did that make the cut in the final merits report?
A. No.
Q. Why not?
A. I didn't think it would help the patients enough. We know it --- we know it's affected. There is evidence of that, but I didn't think it would help them enough to do it. It's one of the things we know, by the way, that's good about PFOA exposure. The direction of the change is lower, which is good.
Q. For C reactive protein?
A. That's correct.
Q. Which is a marker of inflammation.
Correct?
A. That's right. And that's not surprising when you think of inflammation and immunization. They're essentially --- they're essentially two sides of one

coin.
Q. Gamma glutamyl transpeptidase, GGTP, if this test is positive what specific disease, if any, is this test for?
A. It's good for liver. There are a couple of other things that move around with it, but it's --- it's --- it's about liver and it's helpful in the evaluation of different etiologic causes, underlying etiologic causing of liver disease along with the ALT and AST. And it's a more exotic test that I thought long and hard about and didn't include.
Q. What is the sensitivity and specificity of GGT test for diagnosing liver disease?
A. None of these tests alone are terribly sensitive at the usual population cut off as we already discussed. They're --- they're much better about being specific.
Q. What is the predictive value of the GGT test for diagnosing liver disease?
A. That's where they kind of shine. When you --- when you get --- when you have a risk population you start to use these tests. Literature's really good about saying, you know, the test is telling you that there's a liver problem.
Q. Is it fair to say that blood testing for GGT

levels is among the care that would be provided to someone who sees a doctor regularly?
A. No.
Q. Would you find it unusual if some of the Plaintiffs in this matter had their GGT levels routinely checked as part of receiving regular care from the physician?
A. No.
Q. Were you aware that some of the Plaintiffs in this matter have had their GGT levels checked as part of receiving regular care from a physician?
A. No.
Q. Globulin total. If this test is positive what specific disease, if any, is this test for?
A. The test is --- is either for diseases or for immune markers and when I was thinking about it I was thinking about immune markers and subsequently decided that it wasn't enough benefit to the population to keep. To answer your question, total globulins don't diagnose any disease all by themselves. You look at these --- you look at the subpopulations and then you start to see some diseases and that's not actually relevant to the PFOA discussion, which is why --- which is why I didn't include it.
Q. So the globulin test dropped out once you got to

the merits report.
Correct?
A. That's correct.
Q. Glucose, if this test is positive what specific disease, if any, is this test for?
A. We use glucose for diagnosing diabetes. There are a couple of other much rarer conditions that it's used for, by and large this is about diabetes.
Q. Is it fair to say that blood testing for glucose level is among the care that would be provided to someone who sees a doctor regularly?
A. A fasting glucose?
Q. Fasting glucose.
A. Yeah. Not necessarily. They might more likely at a certain age get a hemoglobin A1 C, ---
Q. Uh-huh (yes).
A. --- but I didn't include either in the final because I thought --- this was actually the toughest one that I came across. There's tremendous advantages to doing it, but my --- you know, I sat on the other side of the table and I was a Bennington doctor and I was saying to myself why do that, you know? And so I decided, okay, that's probably what people --- that's probably what my fellow clinicians will say and so I didn't add it. Now, do they really do it in kids where

we still have benefit and we want to find things sooner? You know, I don't know that, but I decided to leave it out and it's --- it's a tough call.
Q. So glucose and HBA1C tests dropped out by the time you got to your merits report?
A. They did. I made every effort to be really conservative and they dropped out, and those are the ones I mentioned to you earlier that I could as easily be criticized for too little as too much. That's the one where I imagine the doctor on the other side of the table saying to me, why the heck didn't you do that? That's the one where I really --- I really look in the mirror and say was that a mistake? It's just a tough call.
Q. Running down the list alphabetically. Immunoglobin serum concentrations of IGA, IGE, IGG and IGM. Did those make the final cut?
A. No. They are effective, but they didn't make the final cut.
Q. Insulin, did insulin make the final cut?
A. No.
Q. Then non-alcoholic fatty disease, additional marker. What is that referring to?
A. I was thinking about using whichever marker was best, so this would be whatever was the up and coming

scout marker. Examples would be cytokeratin fragments. There's some others and I apologize I'm not remembering their names, but there's a bunch of them that different groups are using now to look for this. And what I decided after looking at them was I didn't have enough literature. There wasn't enough familiarity with them, so then I thought it would be in that benefit in the community.

Q. So the test for markers of non-alcoholic fatty liver disease dropped out of the merits report?

A. Well, ALT and AST are --- and GGT are still in there. They're very conventional markers. The up and coming markers dropped out.

Q. So the cleaved cytokeratin fragments test is gone?

A. That's correct.

Q. What about these T helper cytokines, interferon gamma, interleukin 2 and interleukin 4, did those make the final cut?

A. No.

Q. TA --- pardon me. TSH, thyroid stimulating hormones, did they make the final cut?

A. Yes.

Q. If the test for THS is positive what specific disease, if any, is this test for?

A. I'm going to say we're at the end, what it means

to be positive because it's variable, but the disease --- it's thyroid disease. Not thyroid cancer, thyroid disease. What I want to say about the positive is laboratories report these things as one abnormal or normal and the reality is when you go through the literature they should probably report it as gender, race and age specific normals and abnormals. And that would be more useful to clinicians, but few labs are doing that yet.

Q. What is the sensitivity and specificity of the TSH test for diagnosing kidney disease?

A. You mean ---? Okay.

It's okay. I know what you mean. You mean thyroid disease?

Q. Thyroid disease, TSH. Let me withdraw the question then.

What is sensitivity and specificity of the TSH test for diagnosing thyroid disease?

A. Okay.

So it could challenge my memory here. The sensitivity is the thing that you really worry about and there are --- there is a strong clinician minority that says these things are not sensitive enough and we need to be putting patients on medications who have still normal TSH because they're not sufficiently

sensitive. They can be --- they can be what we call, you know, centrally normal and the patient can still be ill. That's the argument. I don't buy the argument. I think that these tests are --- they're not perfect. They're pretty good and they're sufficiently sensitive that we should pay attention to them and not try to worry too much about patients who have rare TSHs.

If you do decide to worry about it, it requires a reasonably high degree of additional verification to show that there really is a T3 problem that would be agreed to by an endocrinologist and not just somebody saying that in the community. It's a contentious issue, but I think the majority opinion is that it is reasonably sensitive. Now, as to its specificity there is variation over time.

Okay.

So if you get an abnormal you might want to repeat it. If you get --- if you got your test done at 9:00 in the morning and 3:00 in the afternoon there could be like a 30 percent variation. And as you already correctly pointed out, 95 percent intervals are either a bell shape or even an asymmetric curve. You can slip outside. So you have to pay attention. You have to actually know what you're doing and not just look at whether it's normal or abnormal.

Q. What is the predictive value of the TSH test for diagnosing thyroid disease?
A. I think I already answered that, that controversy that I discussed aside. You get an abnormal TSH when you repeat it, that's patient you should really consider for thyroid disease. Now, there's thyroid diseases that are not responsive to TSH. There are different diseases. They're less common. Now we're talking about something different.
Okay?
Q. Is it fair to say that blood testing for THS (sic) levels is among the care that would be provided to someone who sees a doctor regularly?
A. No. Again, I don't think that's a routine recommendation. If I order a TSH I've got to associate it with the diagnosis.
Q. Well, let's see what some of the expert consensus states.
Q. Exhibit 14 is the American Thyroid Association guidelines for detection of thyroid dysfunction and please turn with me to the conclusion section on the first page.

(Whereupon, Exhibit 14, American Thyroid Association Guidelines, was marked for

identification.)

BY ATTORNEY WOLFF:

Q. Do you see that, Doctor?

A. Yes.

Q. And it states that the American Thyroid Association recommends that adults be screened for thyroid dysfunction by measurement of the THS beginning at age 35 years and every five years thereafter. This indication for screening is particularly compelling in women, but it can also be justified in men as a relatively cost effective measure in the context of the periodic health examination.

Correct?

A. It does say that.

Q. Do you agree with that?

A. You know, I do. And just for clarification, this is not the USP, the United States Preventive Services, task force who have different recommendations. I actually think these folks are right. I think that this is a better recommendation and I --- I'm not even sure that every five years is good enough when risk goes up, which is the point about medical monitoring. Once risk goes up I think it should be more than every five years.

Q. Would you find it unusual if several of the Plaintiffs in this matter have had their THS levels routinely checked as part of the periodic physical exam?
A. If they did I would think that their doctors were agreeing with me and so I wouldn't find it unusual at all.
Q. Okay.
Were you aware that several of the Plaintiffs in this matter have had their THS levels routinely checked as part of the periodic physical exam?
A. No, I wasn't aware that they had a TSH level checked.
Q. Okay.
Triglycerides, if this test was positive what specific disease, if any, is this test for?
A. Triglycerides is --- again, it's another lipid.
Q. Did the Triglyceride test make the final cut in the merits report?
A. No.
Q. Uric acid, if this test is positive what specific disease, if any, is this test for?
A. Both hyperuricemia and gout are codeable and that's what it's for.
Q. And what is the sensitivity and specificity of

this test for diagnosing hyperuricemia?
A. Sensitivity. You didn't ask about predictive value.
Q. That'll be next.
A. Okay.
So let's think about sensitivity. That's a definitional one, so by definition we have cut offs and so the answer is sensitive because it's defined by itself.
Okay?
Does that make sense to you?
Q. Uh-huh (yes).
A. Okay.
Now, specificity, if the test is negative does the person have hyperuricemia? No.
Okay.
So it is specific and sensitive. It still doesn't help you much, so now you get to predictive value which does.
Q. What is the predictive value of the uric acid test in diagnosing hyperuricemia?
A. Okay.
First you have to get it and then when you get it it's still definitional, but it's not definitional for gout.

Okay?

People can have hyperuricemia without having gout. People can have hyperuricemia with its increased risk for kidney disease without getting kidney disease.

Q. What is the sensitivity and specificity of the uric acid test for diagnosing gout?

A. I should add one other thing about uric acid ---

Q. Okay.

A. --- because you asked me something before, which I answered incompletely. Uric acid also goes up with the number of other cardiovascular risks, so it's not absolutely specific for just what we're doing with our uric acid handling and that whole --- whole pathway.

Okay?

And I should have mentioned that because that's one of the things that we found to be the case with perfluoroalkyl substances.

Q. Okay.

A. I'm sorry.

Q. No, no. That's okay. So what is the sensitivity and specificity of the uric acid test for diagnosing gout?

A. How many people with high uric acid get the diagnosis of gout? It's not the majority, but I don't know the percent.

Q. What is the predictive value of the uric acid test for diagnosing gout?
A. I thought --- I'm sorry. I thought that's what you asked me. That's the question I answered.
Q. Oh, okay.
A. Because that's the logical question. The other questions are kind of actually --- they're interesting, but not that important to patients. But that one is important.
Q. Okay.
So ---?
All right.
So let me --- let me ask the question again. What is the sensitivity and the specificity of the uric acid test for diagnosing gout?
A. Okay.
So let's see. So if you had a low uric acid and you're not on medications, meaning you don't already have a diagnosis of gout it's --- it's pretty darn specific.
Okay.
Now, there's other kinds of gout.
All right.
Not limiting the answer to uric acid gout.
Okay.

So now let's say that the opposite is true and we got a high one.

Okay?

So it's a high uric acid. It's a positive test. It's sort of definitional for --- for hyperuricemia, but then the predictive value later down the road. So it's a hundred percent, but the predictive value later down the road, which is the question you asked last, is not a hundred percent. It's much lower. I can't give you the percent, but it's less than half.

Q. Is it fair to say that blood testing for uric acid levels is among the care that would be provided to someone who sees a doctor regularly?

A. No.

Q. Would you find it unusual if several of the Plaintiffs in this matter have had their uric acid levels routinely checked as part of a periodic physical exam?

A. No.

Q. Were you aware of the fact that some of the Plaintiffs in this matter have had their uric acid levels checked as part of receiving medical care from a physician?

A. No.

Q. Wouldn't you agree that pregnant women are

routinely screened for pregnancy induced hypertension as a standard part of prenatal care?

A. Yes, enthusiastically.

Q. And post menopausal women do not get pregnancy induced hypertension.

Do they?

A. We're not talking about anything that's really weird or wild like, you know, implanted --- you know? Generally not.

Q. Not in the weird and wild.

A. Yeah. Okay.

I mean, you do know that there are techniques capable of implanting a --- a --- a --- a developing fetus in people who are no longer menstruating. So that can be done. Whether it's smart or not is a separate question, but in general you are correct. I mean, people --- people are of reproductive age for a specific period in their life. And it's defined by the beginning and --- the beginning is a little tricky, but at the end it gets less tricky, the beginning and end of menstruation.

Q. Are women who are in their mid 50s and in their 70s going to be breastfeeding infants?

A. I've not seen a woman in their 50s breastfeeding infants, but I have read about it and so that's just

something for you to know. I've never seen it. I think it's probably pretty rare.
Q. Are women in their 70s going to be breastfeeding infants?
A. I don't think so.
Q. Are you aware of the fact that Linda Crawford is in her 70s?
A. No, I don't --- I don't think I know any of the ages of --- or have seen any of those kinds of details from any of the class.
Q. So you didn't know that Leslie Addison, for example, is in her middle 50s?
A. No.
Q. Leslie Addison, all other things being equal, is not a woman of child bearing age.
Is she?
A. There are some people in their early 50s who give birth. It's pretty rare in their late 50s and it's pretty rare in the early 50s. I think by mid 50 it's next to zero.
Q. And Linda Crawford at age 70 is not a woman of child bearing age.
Is she?
A. No.
ATTORNEY WOLFF:

Let's go off the record, please?
VIDEOGRAPHER:
Going off the record at 1:44 p.m.
OFF VIDEO

(WHEREUPON, A SHORT BREAK WAS TAKEN.)

ON VIDEO
VIDEOGRAPHER:
Back on the record at 1:50 p.m.
BY ATTORNEY WOLFF:
Q. Is it correct that if a clinical laboratory or other test is not listed in your merits report that it is no longer included in the medical monitoring program that you are proposing?
A. Yes.
Q. And is it correct that the only outcomes that you are proposing medical monitoring for are those identified on pages 20 through 25 of your merits report?
ATTORNEY WHITLOCK:
It's Exhibit 4.
A. Yes. That is why I'm proposing at this time. Let me add a small caveat to that. I don't --- I don't see harm in survey questions about other outcomes. I don't

see any potential for harm in doing that, but in terms of what we're directing the monitoring enterprise at these are the listed conditions.

BY ATTORNEY WOLFF:

Q. Sensitivity, when one talks about the sensitivity of a clinical test sensitivity is typically expressed numerically.

Is it not?

A. Sensitivity, and specificity and predictive value are all numerical concepts.

Q. And is there a reason why when I asked you to describe the sensitivity, and specificity or the predictive value of various tests that you are proposing your answers were qualitative rather than quantitative?

A. Yes.

Q. What was the reason?

A. Because it depends on the --- for predictive value, of course, it depends upon population prevalence. For sensitivity and specificity it varies depending on the specific test and for that test it's always a moving target. So your today sensitivity and specificity doesn't have to be your tomorrow sensitivity and specificity.

And to the patient --- let's get back to the

patient, or the participant or the population. To the --- to the patient or the population the thing that matters is the predictive value.

Q. On page 15 of your class certification report you refer to the example of medical monitoring of children and communities for lead poisoning.

Correct?

A. Yes.

Q. And while we know that high levels of lead can be a toxicant, public health screening is not done on the basis of low levels of lead.

Is it?

A. I find your question to be a non sequitur. Could you rephrase it?

Q. Public health screening is not done on the basis of low levels of lead.

Is it?

ATTORNEY WHITLOCK:

I'm going to object --- object to the form.

A. The way you've asked that question puts the cart before the horse.

Okay?

So I can't look at a child unless I know quite a bit of additional information and predict what that

child's lead test is going to be. So I don't know in advance. That's why I do the screening.

BY ATTORNEY WOLFF:

Q. One must have a high enough level and have demonstrated toxicity to justify public health screening.

Isn't that correct?

A. You're --- you're --- you're asking that question in a way that every physician who does this could disagree with you. I'm sure you're getting at something important, but you've got something confused. We screen children because we don't know their levels. We don't screen children because we do.

Q. We know that lead was one of the first metals used by humans and was the cause of the first recorded occupational disease, which was lead colic in a fourth century BC metal worker.

Correct?

A. I'm not going to debate the --- it's a great literature about which is the first report.

Okay?

There's --- there's also some --- some people who say there are earlier reports of something different in the Bible.

Okay.

But whether --- which then you can then start to argue about how far back its antecedents are. With that said, lead is a toxin of great antiquity and you're right that it's very toxic on a pound for pound basis. It's --- it's up there or worse than arsenic, which people don't understand until you explain to them how toxic it really is.

Q. And we know that lead was banned from paints used in residential and public buildings in the United States in 1977.

Correct?

A. I think you're right about '77. I was carrying '79 in my mind, but I think that's more of an asbestos number. I think '77 is probably right for lead.

Q. And we know that lead was phased out and then banned from use in gasoline in the United States between the 1980s and the mid 1990s.

Correct?

A. Right. There's still lead in very specific specialty gasoline or fuels. I think gasoline might not be the right word for some of those specialty fuels, but by and large you just don't buy lead for your car anymore in the U.S.

Q. We know that children younger than five are at increased risk for elevated blood level --- blood lead

levels and lead toxicity because of increased hand to mouth activity, increased lead absorption from the gastrointestinal tract and greater vulnerability of developing central nervous system.

Correct?

ATTORNEY WHITLOCK:

Object to the form.

A. He's correct about everything he said although you put in the context of higher lead levels and central nervous system is not about higher lead levels. It's about an outcome of the lead levels, but everything you said is individually true.

BY ATTORNEY WOLFF:

Q. And we we know that lead poisoning from deteriorating old paint is the primary source of elevated blood levels in children.

True?

A. Yes. I tell my --- we tell our residents and medical students and even --- even the freshman taking or sophomore taking introduction to environmental health as undergraduates that 95 percent of the time it's when you find lead poisoning and you look back the answer is paint. And then we go on and tell them the other 5 percent, the really fun things that all the myriad of places, the unbelievable panoply of things

that have led to lead poisoning that all of us have seen once or twice.

Q. What's the most unusual that you've seen?

A. I have a publication which is entitled Home on the Range and that's exactly what it was. This is an ancient publication, early '90s possibly and a family decided that they needed --- that they wanted to have a rifle range in their home. And then they decided that the kitchenette that they built to entertain neighbors near the rifle range was a great place for them to have their food, and that led to a series of consequences.

That's the most interesting, but things that people don't know about are also interesting. Somebody who put a hose in a creek and then ran the hose for maybe more than a quarter mile. I mean, I didn't know before that that lead was a common plasticizer. That's how I learned.

Okay.

And so, you know, you just find these things out as you go. And then everybody knows about the jewelry and cosmetics, but they're rare. You see them, but they're rare.

Q. Sure. I mean, we know that the risk factors for increased blood levels in children and adults are largely socioeconomic and they include minority raised

ethnicity in urban residents, low income, low educational attainment, older housing, recent or ongoing home renovation, pica, the use of ethnic remedies, cosmetics, exposure to lead glazed pottery, occupational exposure and even recent immigration.

Correct?

A. Yes. I've not seen one in a recent immigrant myself personally. I've seen all of the above at some time.

Q. And we know that treatment options for elevated blood --- blood lead levels include residential lead, hazard control efforts including counseling and education, dust or paint removal, and soil abatement as well as chelation and nutritional interventions.

Correct?

A. All of those things. Some of them are way more important than others. All of those things are part of the repertoire. And just moving family out, you don't just remediate the home. You try to move --- move the family out.

Q. Exhibit 15 is an excerpt from the USPSTF Guide to Clinical Preventive Services 2014.

(Whereupon, Exhibit 15, Clinical Preventive Services Excerpt, was marked for

identification.)

BY ATTORNEY WOLFF:

Q. Please turn with me, Doctor, to page 67.

ATTORNEY WHITLOCK:

Counsel, I don't believe there is a page 67.

ATTORNEY WOLFF:

Which you're right. My trusty legal assistant is not so trusty.

BY ATTORNEY WOLFF:

Q. Let me ask you this, Doctor. The USPSTF does not recommend testing asymptomatic children at ages one to five years who are at average risk.

Does it?

A. You're talking about for lead?

Q. Yes, for lead.

A. You know, I don't know the answer to that question. We --- it depends on what you mean by average risk. If by average risk you mean we know that this child lives in a neighborhood where all the housing and schools are built after 1977, which there are plenty of places where that is the average, then the recommendation we generally make is that you don't need to screen in that neighborhood unless there's

other issues going on. But I don't know that the USPSTF says anywhere that you shouldn't screen children for lead. I --- if it's there, I missed it.

Q. Were you aware that the USPSTF found there was insufficient evidence to recommend screening in asymptomatic children ages one to five who are at increased risk?

A. Insufficient evidence to screen the USPSTF, to my knowledge USPSTF has never made a recommendation against screening. They may say that the evidence for screening has holes in it, but they have never to my knowledge made a recommendation against screening. And in most of the 50 states, so you're clear, we're doing screening.

Q. On page 16 of your report you allude to medical monitoring for asbestos.

Correct?

A. Yes.

Q. The adverse health effects of asbestos exposure have been known for decades.

Haven't they?

A. Well, we add some more recently, but the most important ones have been known since the '70s and actually people are still fighting about them in the '70s, but yeah they were known. They were just some

sort of rear guard people who said, no, it can't be true, but I don't think they exist anymore.

Q. And injuries caused or allegedly caused by asbestos have for decades upon decades led to an elephantine mass in asbestos cases in state and federal courts.

Haven't they?

A. I don't want to pretend that I'm an expert on that. A clinician's perspective is there's a lot of legal activity around asbestos and I'll leave it at that. I don't want to --- in another life could I have gone to law school? Could be, but I didn't.

Q. On pages two and seven of your report you make reference to being involved with the C8 project including being responsible for a website that provided open access summary data from that project.

Correct?

A. Yes.

Q. You are aware that by a negotiated agreed upon settlement Dupont has been funding a C8 health project and a medical monitoring program.

Correct?

A. I know about the settlement. Medical monitoring program, the details of that are not --- the details that were back in 2005 and '06 I'm very aware of. The

details going forward I don't have that much in my mind about, you know, what the medical monitoring is for people today.

Q. I apologize for blaming my legal assistant. I'm going to give a new exhibit. Exhibit 16 is another excerpt of the 2014 USPSTF Guide and if you would turn to page 67 in this exhibit.

(Whereupon, Exhibit 16, Blood Levels in Children and Pregnant Women, was marked for identification.)

BY ATTORNEY WOLFF:

Q. And this exhibit does contain page 67.

ATTORNEY WHITLOCK:

This exhibit does have a page 67.

ATTORNEY WOLFF:

Sixty-seven (67). Yes, it does.

BY ATTORNEY WOLFF:

Q. And you see that there's a chart entitled blood levels in children and pregnant women?

A. Yes.

Q. And if you take a look in the second column it says asymptomatic children ages one to five years who are at average risk?

A. Yes.
Q. It says recommendation is do not screen for elevated blood levels?
A. I see that. I have to figure out what they mean by average risk. They --- I --- I believe they must mean that they know that the child's not where there is lead paint. That's the only thing that I can think of because where there is lead paint we screen kids. We only don't screen kids in neighborhoods where there isn't and that's sort of U.S. wide, so they must mean --- I'd have to delve into the details of this.
The preventable consequences of lead poisoning are such that where lead poisoning exists in a community we screen for it. And this recommendation probably has a context in which something like average risk means that there is no known possibility of exposure. So that's all I can think of. Kids around lead paint, we screen and if you live in a brand new suburb in a place where there's never been lead paint and it's a population that doesn't have any outcomes we may not screen.
Q. And if you turn to the very bottom of that chart in the same column when the USPSTF balances the benefits and the harms, they say given the significant potential harms of treatment and residential lead has abatement and no evidence of treatment benefit. The

harms of screening for elevated blood lead levels in children at average risk outweigh the benefits.

Correct?

A. I haven't read it, but I assume you read it --- I assume you read it correctly. So I assume they said that.

Q. Okay.

Exhibit 17 is a paper by Frisbee, you and others entitled The C8 Health Project Design Methods and Participants.

(Whereupon, Exhibit 17, Dr. Ducatman's Paper, was marked for identification.)

BY ATTORNEY WOLFF:

Q. Correct?

A. Yes.

Q. And in the C8 health project that you were associated with participants provided a blood sample one time.

Correct?

A. That's partially correct, but the one that I was associated with at the beginning had only one blood sample. Then later there were follow-up blood samples for the subset of the population under the aegis of the

science panel.
Q. In this paper Frisbee it's a one time ---
A. Yes.
Q. --- sampling?
A. That's correct.
Q. Did you have any role with the C8 medical monitoring program?
A. Yes.
Q. Exhibit 18 is the April 7, 2017 status report in connection with the C8 medical monitoring program.

(Whereupon, Exhibit 18, 4/7/17 Status Report, was marked for identification.)

BY ATTORNEY WOLFF:
Q. Have you seen this document before?
A. No.
Q. Are you aware that since September of 2014 notice packets were mailed to more than 99,000 potential class members in connection with the C8 medical monitoring program?
A. I was generally aware that things have gone out to people, but I don't know what's in them or how many people got them.
Q. Are you aware that between September 2014 and

April 7th, 2017 compared to the 99,065 notice packets that were mailed only 6,681 registrations were received?
A. No, I wasn't aware of that.
Q. Were you aware that of those 6,681 registrations received 5,957 were deemed eligible for medical monitoring?
A. Not aware of that either.
Q. Even if all 6,681 registrations received were eligible that's a response rate of less than 7 percent. Correct?
A. You said it wrong, but I'm sure you've done your math correctly. You left out a digit there when you were going over it, but I'm sure you calculated it correctly and I'll accept it. The percent you got right. You actually --- when you said the number if you go back and read it ---.
Q. 6,681. If that's not what I said, that's what I meant to say. Do you consider seven percent to be a good response rate?
A. No, that's not great.
Q. Were you aware of the fact that between September 2014 and April 7th, 2017 compared to the 99,065 notice packets that were mailed only 2,020 physician appointments were made by eligible class members?

A. No.
Q. 2,020 physician appointments is just two percent of the potential class members who were mailed notice packets.
Right?
A. Sounds about right.
Q. Do you consider a collective utilization rate of just two percent over the course of more than two and half years to be a good utilization rate?
A. No.
Q. Since the medical monitoring comes at no monetary cost to the class members do you know why the utilization rate has been just two percent collectively over the course of more than two and a half years?
A. I've heard it discussed, but I don't have an opinion other than what I heard discussed. Do you want me to discuss --- do you want me to review what I've heard discussed?
Q. No, I only want to know if you know.
A. I don't know independent of what I heard discussed.
Q. Since screening and asymptomatic population must involve many people to potentially benefit a few does a collective utilization rate of just two percent over more than two and a half years make the C8 medical

monitoring program a success or a failure in your opinion?

ATTORNEY WHITLOCK:

Object to the form.

A. You said a couple of things. One is a preamble of that you need to screen many to find a few. That's sometimes true and sometimes not. And then you talked about this effort by actually the Rozen firm because they're actually sort of in charge of it. And I would say that their part of this has been a notable problem and failure. I expected at some point that the people who are in charge are going to find some way to get to somebody who's better than this. When we did the screening you probably do know that it was for those who --- for those who we can account to was in the neighborhood between 80 and 81 percent.

BY ATTORNEY WOLFF:

Q. Right.

That was a survey.

Correct?

A. You pointed out correctly. It was a one time survey.

Q. And they were paid money in order to complete the survey.

Correct?

A. Right.

The settlement --- the settlement went to them as money that came with the survey and then the science panel followed up on a subset, which they chose randomly. And I think that you would have to go back, but my recollection is that they got a better than 60 percent response rate. But we'd have to check the literature on that. Those are the articles by --- for example, Steenland, and that would be later in time and I had no part in that.

Q. Right.

I mean, if we take a look at your paper the Frisbee paper on page 1875 in the middle column, smack dab in the middle of the page it says each verified participate received a $150 for completing the health survey and an additional $250 for providing a blood sample regardless of sample quantity or quality?

A. Right.

That's how --- that's how participants got the benefit when they participated.

That's exactly right.

Q. On page seven of your class certification report you recommend that the proposed medical monitoring program include a medical survey.

Correct?

A. Yes.
Q. Is it fair to say that this medical survey would fit into the medical surveillance component of your proposed medical monitoring program?
A. Yes.
Q. And you proposed to base this survey on one used in the C8 health project.
Correct?
A. It's a model.
Q. Exhibit 19 is a document that comes from the website identified in paragraph A on page seven of your report.

(Whereupon, Plaintiff's Exhibit 19, Website Excerpt, was marked for identification.)

BY ATTORNEY WOLFF:
Q. Have you seen this document before?
A. Yes, certainly on the web. Probably even in paper form, too, but for sure on the web.
Q. The first page says notice this survey was developed by Brookmar, Inc. for use solely by the C8 health project.
Correct?
A. Yes.

Q. And this survey was developed following the settlement of a lawsuit against Dupont.

Correct?

A. Yes.

Q. And the scope of the medical monitoring program in that case was set by the terms of a settlement agreement between the parties.

Correct?

A. Yes.

Q. And this survey collects information on a number of topics ranging from demographics, to employment history, to military history as well as medical, social and family history.

Correct?

A. Yes.

Q. Please turn with me to page three and in the first ---.

ATTORNEY WHITLOCK:

Counsel is that the third ---

ATTORNEY WOLFF:

The third page.

ATTORNEY WHITLOCK:

--- page?

Okay.

Apparently they are not numbered.

ATTORNEY WHITLOCK:

Yeah, it does not look like it.

BY ATTORNEY WOLFF:

Q. Okay.

So the third page in this exhibit in the first full paragraph following the heading the purpose of this project. Do you see that at the top, Doctor?

A. Yes.

Q. Okay.

Among other things it says the questions are a lot like those you would find on a doctor's office form. They cover many medical problems, but none of the medical conditions asked about are known to have a connection with C8.

Correct?

A. Yes.

Q. And if you would please turn the page to the next page, page four. Toward the bottom in the paragraph labeled benefits it states that there are a few direct benefits to you for taking part in this project.

Correct?

A. Yes.

Q. And the next paragraph labeled risks states that some people who take this survey may become anxious or concerned about their health.

Correct?
A. Yes.
Q. Is it fair to say that the purpose of this survey was not to screen or diagnose any individuals for a PFOA-related health condition?
A. That is fair.
Q. Would you agree that its purpose was only to gather medical and social data to conduct a research study?
A. It ended up having more purposes than that, however, I would say its intent was to be a population community study. Whether you characterize that as a research study or not, I can debate it, but I don't really care about the debate one way or the other. It was not intended as its primary function to deliver healthcare. It ended up doing that in the few very specific instances which I'm prepared to discuss if you want me to.
Q. Let me just ask you this. You would like to use a survey based on the C8 health project survey as part of a medical monitoring program in this litigation.
Correct?
A. Yes.
Q. And how, if at all, would a population based survey such as this one improve the detection and

diagnosis in any particular individual of any of the end points that remain as part of your merits opinion?
A. Do you want me to go through the end points one at a time again at this point or --- I'm not sure what you want to do next because I feel like we've gone over it. And I don't want to --- I don't want to belabor anything, but I'm willing to go back over each --- each thing that we do and discuss it and that's up to you.
Q. I guess I'm just trying to grapple with the notion of how a survey such as this one improves the detection and diagnosis of disease in any particular individual?
A. So at this time I think you're asking me about history. I mean, I'm going to think I understand your question and talk about the passage of time, what we knew then and what we know now and see if I --- see if you think that gets at your question.
Then what we knew about PFOA --- and by the way PFOS and PFHxS and PFNA was not a lot, especially not in humans. There was essentially no information and there was a claim that it was physiologically inert in humans actually this time, which the survey shows. And other things that were happening simultaneously showed to be not correct.
Okay.
So the things that were found in this survey and in

other information, not just this survey, then provided us with an idea of what are the human outcomes. This --- this was early than others replicated or didn't replicate depends on what outcome you're talking about. For the replicated outcomes some of the things that are in this survey are still the things that you would want to ask. The design is kind of nice. It worked very well on the web.

Virtually everybody who filled it out actually was able to do it on the web and come in for help or validation, which was very efficient, and so I kind of like that design. I think it was a good thing to replicate in terms of sort of community friendliness. Now, this covers topics that are no longer proposed there. They're now edited out because back then we didn't know.

There's also mixed topics that, you know, I go you got uric acid and you didn't ask about gout, you know. So gout information is now coming out later.

Okay.

But you can't tell anything about gout from this survey because we didn't ask.

All right.

So that's --- that's about the passage of time. We know things from this survey. We know what to pull out

of it and what to ignore. In addition really important concern of this survey is now much less of a concern based on lots and lots of additional information that this survey got and others. And that is that if you have this in your water, water becomes the source of exposure. That was not known at the time.

Okay?

We did not know that. It was a hypothesis that it would be. It was a hypothesis that was vigorously disputed by some people. We now know it's the case, so we don't have to do some of the extensive questions that we asked here about which job, and then which job, and then which job. And we could cut back on some of the other things, too. So we can streamline the survey and add some things to it, it will still be smaller. Is that where you were going with your question or do you want me address individual diagnoses again?

Q. I --- no, no. That was the spirit in which I asked ---

A. Okay.

Q. --- the question.

A. I apologize. I also forgot. We had an idea that pregnancy was going to be important, but we also didn't how it was going to be important. We didn't know all of the ways it was going to be important, so it may be

that we can streamline some of those pregnancy questions. This --- this has a lot of reiterated information. It's actually bigger than this printed document suggests about how much pregnancy information you could put into the survey.

Q. On page --- the top of page five of your merits report, which is Exhibit 4, you make reference to the C8 science panel having found a, quote, probable link, closed quote between PFOA exposure, and kidney cancer and PFOA and testicular cancer.

Correct?

A. Yes.

Q. Are you relying on the probable link findings from the C8 science panel in forming your opinions in this case?

A. I'm relying on the epidemiology, yes, that's been published. That's part of --- the probable link piece of it is a kind of a term of art that was used in the --- in the settlement and so I'm quoting the settlement words because that's the technical correct thing that happened in the community. The publications themselves didn't get to the words probable link. The publications were just what you would expect to see for epidemiology.

Q. Right. So the C8 science panel made a number of

probable link determinations for lack of a better phrase, I mean, they took a look at maybe three dozen or so end points and they said we don't think there is a probable link for the vast majority of them and we think there is a probable link for a handful of them. And my question to you is are you relying on any of those so-called probable link findings for that handful of end points in forming the basis of your opinions in this case?

A. I think I've answered the question, but I'm happy to repeat it in case repetition can bring clarity. It's the studies, not the --- not the term of art.

Okay.

The term of art is something I merely quoted because it's on us to understand that's what they were asked to do for their formal role, but it's the epidemiologic studies themselves and they're not the only things. They're the things that inform my opinion.

Q. So here's --- here's the disconnect and maybe we can just clarify it. Members of the C8 science panel, Carl (sic) Steenland and others have submitted manuscripts to peer review medical and scientific journals. And some of those manuscripts have now been published in the medical and scientific literature, and

I know that you've cited a number of those in your report.

Correct?

A. Yes.

Q. As distinguished from the papers that have been published in the peer reviewed literature the probable link findings are available only on a website. They've not been submitted for peer review, they've not been published in a journal.

Correct?

A. Well, I don't know the answer to that and let me tell you why. There is this one review article they did in which they discussed some of that stuff and I don't know if that's in the review or not. So I just can't answer.

Q. My --- I guess my question is, are you relying on these probable link reports that are found primarily if --- or if not exclusively on the website in forming your opinions?

ATTORNEY WHITLOCK:

Objection. Asked and answered multiple times.

A. Objection aside I'm happy to repeat what I said before. Would that be helpful?

BY ATTORNEY WOLFF:

Q. Yeah, go ahead.
A. Okay.
They published the epidemiology.
Q. They published. I get it that they published.
A. And --- and those epidemiologic --- epidemiology studies --- and it's Kyle Steenland. You said Carl.
Q. Oh, I thought I said Kyle.
Okay.
A. Anyway --- and by the way, Kyle is actually Nelson, which makes it even more complicated, but he goes by Kyle. And it's Kyle in the National Library of Medicine. So he's Kyle, but those epidemiology studies are what I rely on and I --- I didn't mean to cause any confusion.
I just wanted to be transparent that their role was --- you know, their formal legal role as requested by the settlement, which both sides agreed to, was, you know, to find these probable links or to rule them out. And that's what they did as you pointed out on the website and that's not what I --- I don't think I referred to those, and if I did I probably shouldn't have. But I don't think I did.
Q. Okay.
Because I saw --- I saw the probable link referenced at the top of page five of your report, your

merits report, which is why I'm asking these questions.
A. Yeah.
Okay.
It's --- it's the studies.
Q. The --- the published studies?
A. The published studies.
Right.
Q. So if I go to the archived peer reviewed published literature that's what you're relying on?
A. Correct.
Q. Not the stuff that's on the website?
A. It's --- it's nice to have that stuff. It tells you very succinctly what their opinion is and their opinion is based upon their published studies.
Q. Okay.
A. There's one small topic not related to what we're doing where actually you have to go to the website and see what they thought and it's none of these things. Do you want me to go over that?
Q. No.
A. Okay.
Well, you raised the point about what's on the website --- what's on the website and what's --- what's in the literature. There is one topic that's only on their website where I know they're correct because

we've seen it and we're going to characterize it in a peer review because it's never been done. But it's actually not related to anything that we've been discussing here. It's indirectly related to one topic, but it won't be related to the proposed medical monitoring.

Q. Let me take a break because I'm either done, or just about done or want to confer with my colleague?

VIDEOGRAPHER:

Going off the record 2:32 p.m.

OFF VIDEO

(WHEREUPON, A SHORT BREAK WAS TAKEN.)

ON VIDEO

VIDEOGRAPHER:

Back on the record at 2:39 p.m. Dr. Ducatman, thank you. I have no further questions for you at this time.

A. Thank you.

ATTORNEY WHITLOCK:

No questions.

* * * * * * * * *

VIDEOTAPED DEPOSITION CONCLUDED AT 2:39 P.M.

* * * * * * * * *

ACKNOWLEDGMENT OF DEPONENT

I, ALAN DUCATMAN, M.D., do hereby certify that I have read the foregoing transcript of my testimony taken on 2/28/18, and further certify that it is a true and accurate record of my testimony (with the exception of the corrections listed below):

Page	Line	Correction

_____

ALAN DUCATMAN, M.D.

SUBSCRIBED AND SWORN TO BEFORE ME

THIS _____ DAY OF _____, 20___.

_____ _____

(NOTARY PUBLIC) MY COMMISSION EXPIRES:

COMMONWEALTH OF PENNSYLVANIA)
COUNTY OF ALLEGHENY)

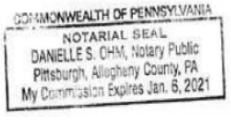
CERTIFICATE

I, Danielle Ohm, a Notary Public in and for the Commonwealth of Pennsylvania, do hereby certify:

That the witness whose testimony appears in the foregoing deposition, was duly sworn by me on said date and that the transcribed deposition of said witness is a true record of the testimony given by said witness;

That the proceeding is herein recorded fully and accurately;

That I am neither attorney nor counsel for, nor related to any of the parties to the action in which these depositions were taken, and further that I am not a relative of any attorney or counsel employed by the parties hereto, or financially interested in this action.



Court Reporter
Danielle Ohm

g

Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

DISCLAIMER: THE FOREGOING FEDERAL PROCEDURE RULES ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY. THE ABOVE RULES ARE CURRENT AS OF SEPTEMBER 1, 2016. PLEASE REFER TO THE APPLICABLE FEDERAL RULES OF CIVIL PROCEDURE FOR UP-TO-DATE INFORMATION.

VERITEXT LEGAL SOLUTIONS
COMPANY CERTIFICATE AND DISCLOSURE STATEMENT

Veritext Legal Solutions represents that the foregoing transcript is a true, correct and complete transcript of the colloquies, questions and answers as submitted by the court reporter. Veritext Legal Solutions further represents that the attached exhibits, if any, are true, correct and complete documents as submitted by the court reporter and/or attorneys in relation to this deposition and that the documents were processed in accordance with our litigation support and production standards.

Veritext Legal Solutions is committed to maintaining the confidentiality of client and witness information, in accordance with the regulations promulgated under the Health Insurance Portability and Accountability Act (HIPAA), as amended with respect to protected health information and the Gramm-Leach-Bliley Act, as amended, with respect to Personally Identifiable Information (PII). Physical transcripts and exhibits are managed under strict facility and personnel access controls. Electronic files of documents are stored in encrypted form and are transmitted in an encrypted fashion to authenticated parties who are permitted to access the material. Our data is hosted in a Tier 4 SSAE 16 certified facility.

Veritext Legal Solutions complies with all federal and State regulations with respect to the provision of court reporting services, and maintains its neutrality and independence regardless of relationship or the financial outcome of any litigation. Veritext requires adherence to the foregoing professional and ethical standards from all of its subcontractors in their independent contractor agreements.

Inquiries about Veritext Legal Solutions' confidentiality and security policies and practices should be directed to Veritext's Client Services Associates indicated on the cover of this document or at www.veritext.com.